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Rock Products

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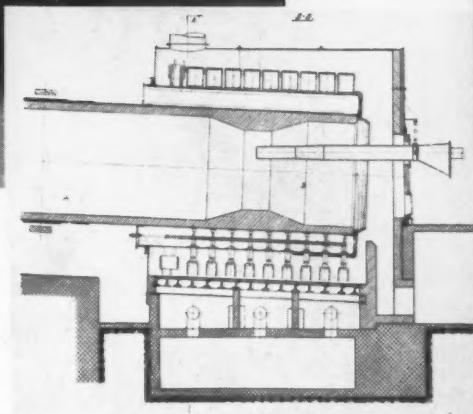
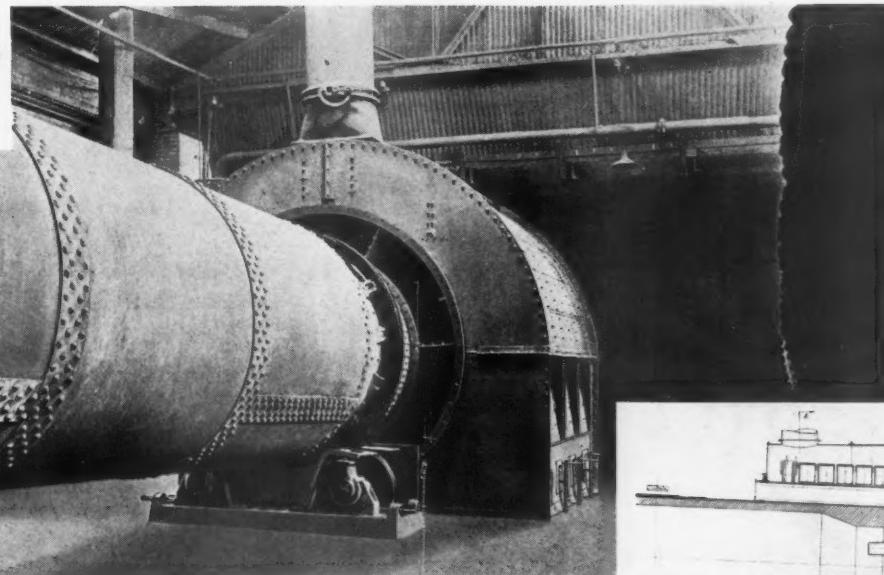
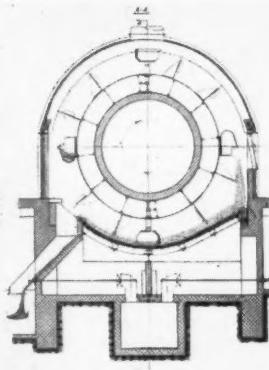
CEMENT *and* ENGINEERING NEWS (Est. 1896)

THE OLDEST PUBLICATION IN ITS FIELD AND THE RECOGNIZED AUTHORITY



UNAX GRATE COOLER

AIR QUENCHING TYPE
INTEGRAL WITH KILN



Advantages

- Rapid, efficient cooling of product.
- Increase in fuel economy of the kiln.
- Increase in grindability of clinker.
- Improvement in quality of the cement.
- Low first cost, low maintenance cost.

THE UNAX GRATE COOLER consists of two parts: one stationary, one revolving. The stationary part comprises a casing surrounding the outlet end of the kiln and containing a stationary grate. The revolving part consists mainly of conveying flights and scoops attached to and rotating with the kiln, spreading the clinker evenly over the grate, through which cooling air is passed. The heated air is used for combustion in the kiln.

The longest kilns in the world (512' and 520') are equipped with these Unax Grate Coolers.

F. L. SMITH & CO.

225 BROADWAY

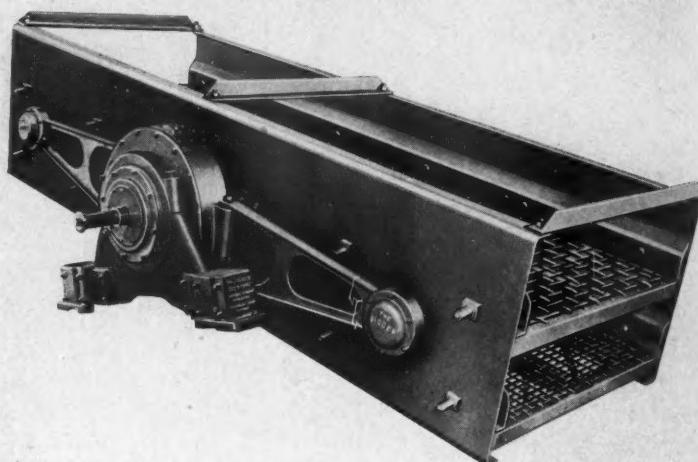
NEW YORK, N. Y.

June, 1935

Rock Products



CIRCLE THROW



S E L E C T R O A JIGGER PRODUCT

SELECTRO Screens are built in 3', 4' and 5' widths and in lengths from 5' to 12'.

Special sizes can be readily made if required, due to the design of our Vibrator Assembly. Machines are made in one, two and three deck types with dust enclosures when desired.

A distinctly different, more effective action found only in the NEW SCREEN "SELECTRO."

This action can be set at any one of several predetermined throws, depending upon the material to be screened.

The "SELECTRO" handles 325 mesh to 10" opening. No additional parts required.

Vibration is controlled and timed to meet specific requirements.

The "SELECTRO" is full tilting and changes can be made even while screen is in operation. Angles are calibrated so that settings, under varying conditions, may be recorded and returned to, as occasion requires.

Fine design and splendid workmanship insure accurate coordination of every element in SELECTRO Screens—the screens "Built by JIGGER."

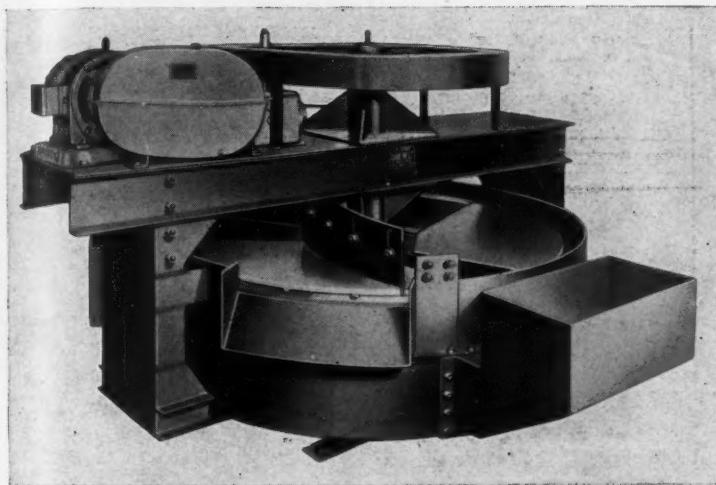
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PRODUCTIVE EQUIPMENT CORP.

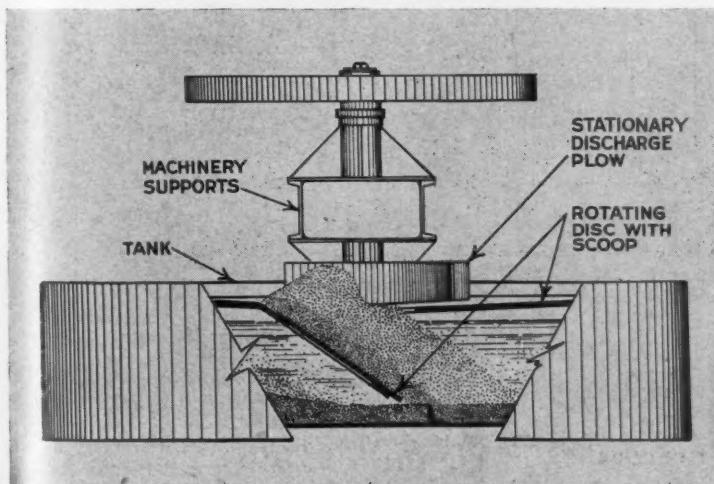
210 E. OHIO STREET, CHICAGO, ILLINOIS

ANNOUNCING THE LINK-BELT DEWATERING

Rotoscoop



6-ft. diameter Rotoscoop, particularly showing feed box and discharge plow, and the complete enclosure of driving machinery.



Above: A simplified sketch illustrating action of the Link-Belt Dewatering Rotoscoop.

Right: View of 15-ft. diameter Dewatering Rotoscoop at the T.V.A. Norris Dam project.

A PERFECTED SAND RECOVERY UNIT

For fine or coarse sand and similar material.

Capable of recovering fine grains and discharging dry enough for truck transportation.

Provides a simple method of saving special grain sizes formerly lost in the overflow water, which flows slowly in a wide, thin stream over an adjustable weir, thus preventing loss of fine grains of good material.

A self-contained unit requiring low headroom, and minimum space and foundations.

Large settling area and slow speed permit effective settling and washing of the solids from the water. Volume of fines and grading easily varied to suit requirements.

Requires little power in relation to its large handling capacity. Send for Folder 1463.

5308

LINK-BELT COMPANY

The Leading Manufacturer of Equipment for Handling Materials and Transmitting Power

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SAN FRANCISCO TORONTO
Offices in Principal Cities



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Recognized the World Over as the Leader in Its Field

Rock Products

With which is
Incorporated

CEMENT and ENGINEERING
NEWS

Founded
1896

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June, 1935

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If you didn't see American Cable's page in January publications, write us and we'll send you a reprint. It tells a story you should know.

"Longer service

MAKES

TRU-LAY most economical"

A WIRE rope buyer recently made the statement that: "They are asking a premium for Tru-Lay, and no one can convince me it gives that much longer service."

To which we replied: "You surely haven't seen the Tru-Lay message for January because, if you had, you would realize that more and more rope users are coming to realize that the increased service given by Tru-Lay Preformed is all out of proportion to the price differential.

"... Here—look at this chart. It shows exactly the progress of Tru-Lay Preformed Wire Rope—since its introduction in 1924. . . . And remember, please, five of those years were depression years—when prices were scanned as never before. . . . In 1924 Tru-Lay Preformed absorbed only 3.9% of American Cable Company's entire volume.

Now—after a steady climb—it commands 79 or 80 percent of our entire plant production. A product has to be right to command that buyer acceptance.

"Tru-Lay Wire Rope is right—because it is preformed. Preforming eliminates all the internal stress characteristic of non-preformed rope—with the result that it gives you much more trouble-free service than any other brand. . . . The chart in this "ad" proves it by revealing buyer acceptance. . . . You know how everyone has been trying to buy cheap. Well, this chart proves that Tru-Lay Preformed Wire Rope must be cheapest in the long run."

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WILKES-BARRE, PENNSYLVANIA

An Associate Company of the American Chain Company, Inc.

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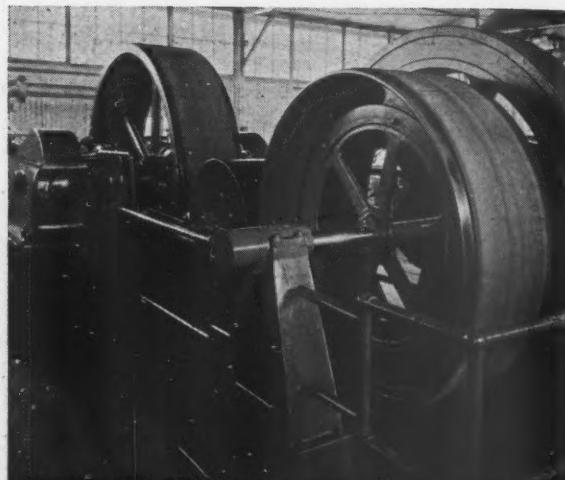
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TRU-LAY * Preformed Wire Rope

* PREFORMED ROPE IS MADE IN ALL TYPES, GRADES, CONSTRUCTIONS AND LAYS

PLYLOCK CUTS POWER COST 5 WAYS



TOP—Previous belts on this crusher drive stretched 5 to 20 inches in a few days. After seven months of operation this Highflex belt showed no stretch at all.

BELOW—Endless Highflex belt, on a gas compressor drive, where sand storms and temperatures as high as 125° F. are frequent. The belt already has run 3 years without the slightest upkeep cost.

NOW that Goodrich rubber belts can be made endless on the machine by the powerful Plylock Splice, as many as five ways to save money are open to users of power. In many plants all five opportunities are available:

1. Rubber belts can be used in place of leather at a substantial saving in cost. On many drives, leather has had to be used because the belt had to be made endless on the machine, and former rubber belt splices would not hold. Plylock makes a splice practically as strong as the belt itself and better than any field or factory splice ever before developed for rubber or leather.
2. In some cases where extensive direct drives have had to be used because belts would not stand up, more economical belt drives can now be employed because Highflex and Plylock make a belt that will stand almost any punishment.
3. Plylock reduces shut-down time, with all its losses in production, idle labor, dead overhead. Highflex Belts, made endless by the Plylock Splice, are making records in hundreds of plants for long, uninterrupted service.



Goodrich



4. You save in maintenance when you use Highflex Endless Belts—no fasteners to buy, far less labor used in belt repair.

5. In addition to the advantages of Plylock, there are the 14 improvements made in Highflex Belt itself. Couple these with Plylock and you have an endless belt which lasts so much longer than ordinary rubber belts and longer per dollar of price than leather, that your belt cost may be cut 25% to 50% or even more.

Most Goodrich Distributors are equipped to make Goodrich Belts endless on your machines and do it in a matter of hours—instead of the weeks required to get factory-built endless belts. For the name of the Distributor nearest you, write The B.F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

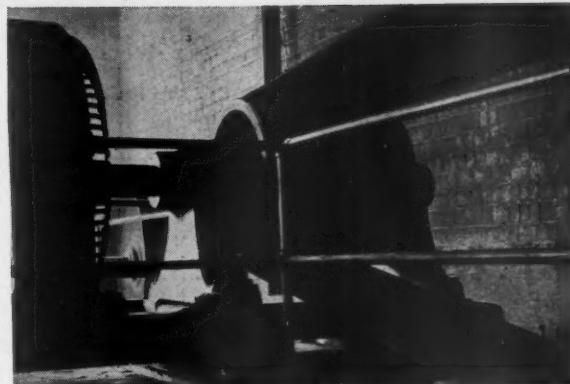
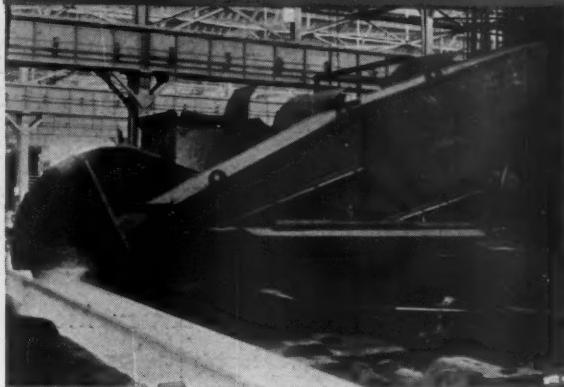
ALL *products problems* **IN RUBBER**

Highflex Belting

TOP—On this hot saw drive, endless Highflex endles five times a second. Particles of hot steel ledge between pulley and belt, imbedding themselves in the belt, which travels at 900 F. P. M. Yet Highflex stands it.

CENTER—This Highflex belt was made endless on the job at Leroy Lime and Crushed Stone Company, Leroy, N. Y. It has operated more than a year without a sign of weakening.

BOTTOM—Endless Highflex drives the last big water-wheel drive in the Miami Valley district at the Wren Paper Co., at Middletown, Ohio.



**PLYLOCK
BELT JOINT**

THE CLIMAX MOLYBDENUM CO. CUTS ROCK DRILLING COSTS 40% with TIMKEN BITS

In March 1934 the Climax Molybdenum Company began an exhaustive test of Timken Rock Bits at their mine at Climax, Colorado. The object was to discover what savings could be effected by the use of removable bits as against reforged steels.

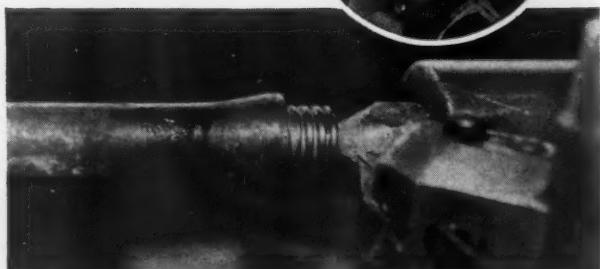
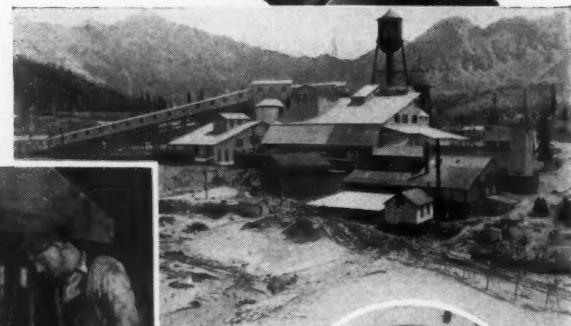
The test was continued for a year, and careful records were kept of every item of cost involved in the use of both the Timken Bits and the reforged steels.

On March 8, 1935, Mr. W. E. Romig, Superintendent of the Climax mine, submitted a detailed report of the test. This report shows that a total saving of 40% was made through the use of Timken Bits.

Timken Bits are effecting similar economies in hundreds of other mining, quarrying, and contracting operations all over the country. It will pay you to use them, too. Write for full information.

Complete Stocks Maintained in Principal
Distributing Centers

THE TIMKEN ROLLER BEARING
COMPANY, CANTON, OHIO



TIMKEN BITS

**DOES
5/8 H. P.
PER TON
INTEREST
YOU?**



THEN INVESTIGATE THE TRAYLOR TYPE TY REDUCTION CRUSHER

A gravel operator who owns one of our new Type TY Reduction Crushers advises:—

" * * I'm shipping 42 tons per hour of through $\frac{3}{4}$ " over the scales from that little crusher * * *

We think that's good work and are pleased to hear about it. Obviously, our friend, the operator, thinks so too, else he wouldn't have mentioned it.

The crusher is fitted with a 25 HP motor and when the operator says "little crusher," that's right too. This "tiny" giant stands 51 inches high and weighs only 9000 lbs.

It has an all cast steel frame and is fitted with Taylor Original, Patented, Non-Chokable Bell Head and Curved Concaves besides having all of the exclusive features of our famous Bulldog Gyratory. And you'll find the price amazingly low!

Write for our Circular 1001 and have our man around for a talk. He'll tell you about the hundreds of old style gyratories we've fitted with our Non-Chokable Bell Heads and Curved Concaves, and how this has converted them into efficient and economical reduction machines.

You lose if you don't use Taylor!

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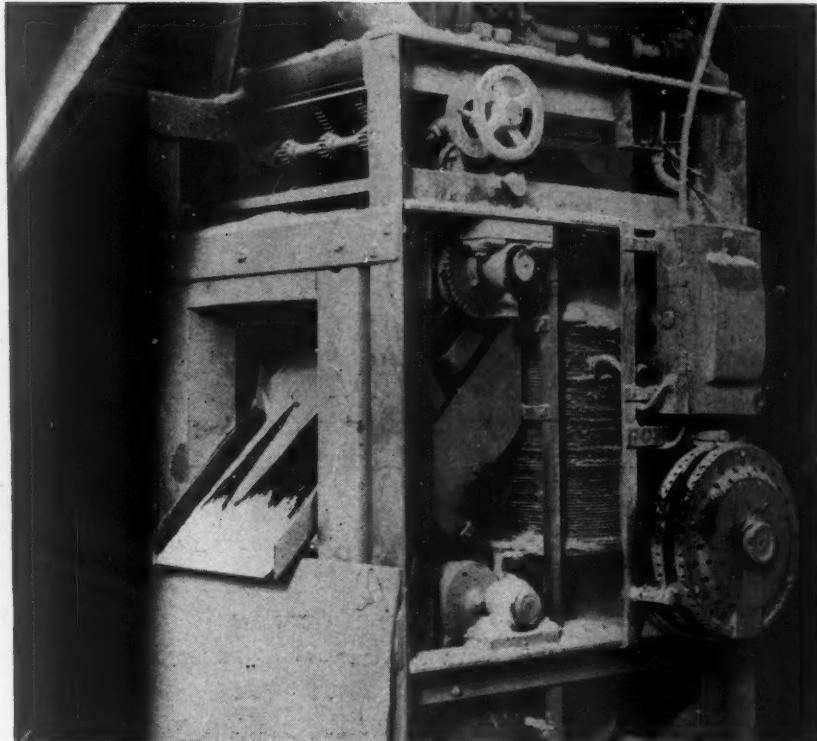
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STAND SHOCKS

In Magnetic Separators

● **SKF** makes practically all types of anti-friction bearings. When **SKF** recommends a particular type of bearing, therefore, you may depend upon it; its recommendations are unbiased!



SKF-EQUIPPED BUILT BY DINGS MAGNETIC SEPARATOR CO.



SKF

BALL AND ROLLER BEARINGS

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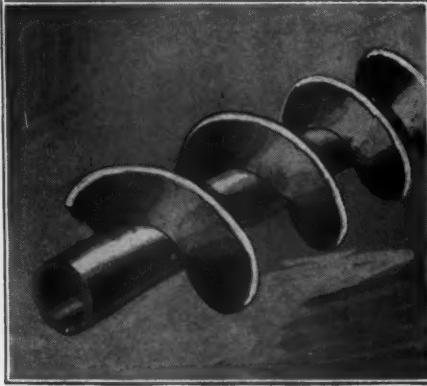
IT'S NO **Soft Job** for bearings to stand the gaff of rolls in this Dings Type IR Super-High Intensity Induction Magnetic Separator. It's a job that means hard work day after day in a blizzard of sand and powdered limestone. It's a job that calls for bearing STRENGTH to take the loads that are applied when deleterious iron is removed from glass sand and limestone.

No wonder **SKF** are employed in this application. They have the stamina for shocks, the low oil consumption that brings down maintenance costs, the protection of sealed housings against dirt and moisture. They never need adjustment and generally last as long as the machine for which they're specified. No wonder Dings find them adaptable. You will, too.

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.



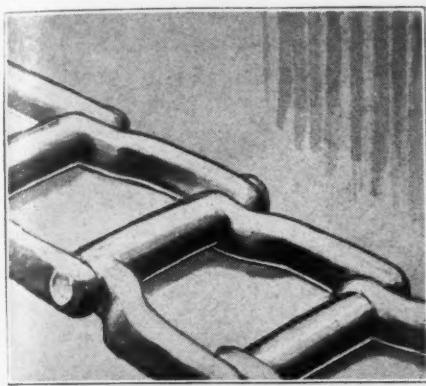
Hard-faced with AMSCO No. 459 Welding Rod, Dipper Teeth last many times longer.



Screw Conveyor Edges, hard-faced with AMSCO No. 459 Welding Rod, many times return their cost.



AMSCO No. 459 Welding Rod is ideally applied to pulverizer hammers of every type.



Drag Chains and Conveyor Flights have a vastly greater life when hard-faced with AMSCO No. 459



AMSCO No. 217, a new hard facing rod, differs from AMSCO No. 459 in giving a much harder deposit although one not quite so tough. Use AMSCO No. 217 for maximum abrasion resistance where no great impact is involved.

AMSCO № 459 WELDING ROD FOR HARD FACING..

Industry has learned the value of hard-facing and is rapidly learning the value of using AMSCO No. 459 Hard-Facing Welding Rod for this work.

AMSCO No. 459 Hard-Facing Rod on tests and during six years of field application has proved its superiority by outwearing by 40% other materials costing twice as much. 200% to 300% greater returns on welding rod investment are being made.

Use AMSCO No. 459 Welding Rod on your work. The exclusive characteristics are:

1. Easy to apply with torch—in coated form, with electric arc.
2. Welds with equal facility to manganese or carbon steel and other ferrous metals.
3. Much tougher than other hard-facing materials with comparable abrasion resistance, does not crack, chip or spall off.
4. Being iron base, it fuses readily with iron or steel parts and is better adapted to the work than hard-facing containing no iron.
5. Its qualities of adhesion and toughness are not lessened by heat treating.
6. Presents outstanding resistance to wear and abrasion, even under impact.
7. Costs much less than comparable materials.

Try AMSCO No. 459 Hard-Facing Rod on your next job. Pug Mill Knives, Plow Shares, Dipper Teeth, Drag Chains, Crusher Parts, Tractor and Road Machinery Parts, Screw Conveyors, Pusher Shoes and hundreds of other machine and equipment parts are readily salvaged by hard surfacing with AMSCO No. 459 Welding Rod.

If you have never used it—send for free samples, instructions and literature.

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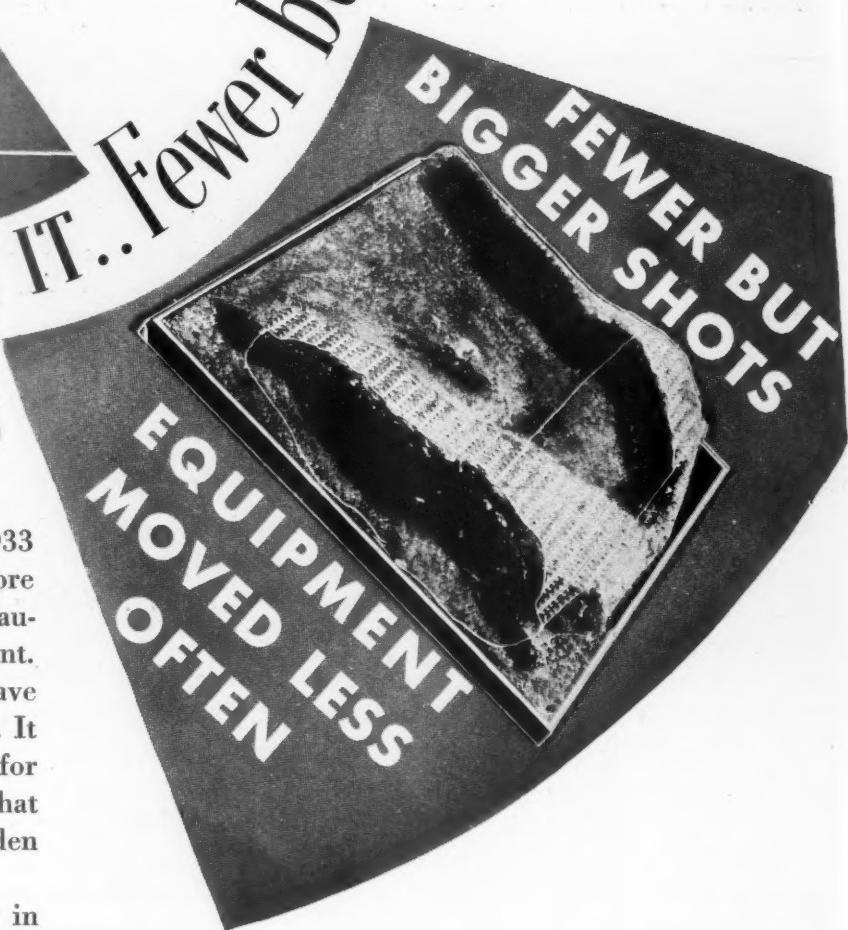


YES WE MEAN IT.. Fewer but
Bigger Shots

Manistique made history in 1933 with a giant blast comprising more than 4,000 six-inch holes. Cordeau-Bickford was the detonating agent. It carried a powerful detonating wave to every cartridge in each load. It also provided a *positive* hook-up for all holes in a planned rotation that resulted in successive relief of burden—and better fragmentation.

Bigger shots also save money in time, in labor, and in wear and tear on machinery and equipment. With shots planned to include groups of holes, drilling can proceed without the frequent interruptions that accompany small blasts. Equipment can remain on the scene until all holes are drilled, instead of being repeatedly removed or covered to make way for smaller shots.

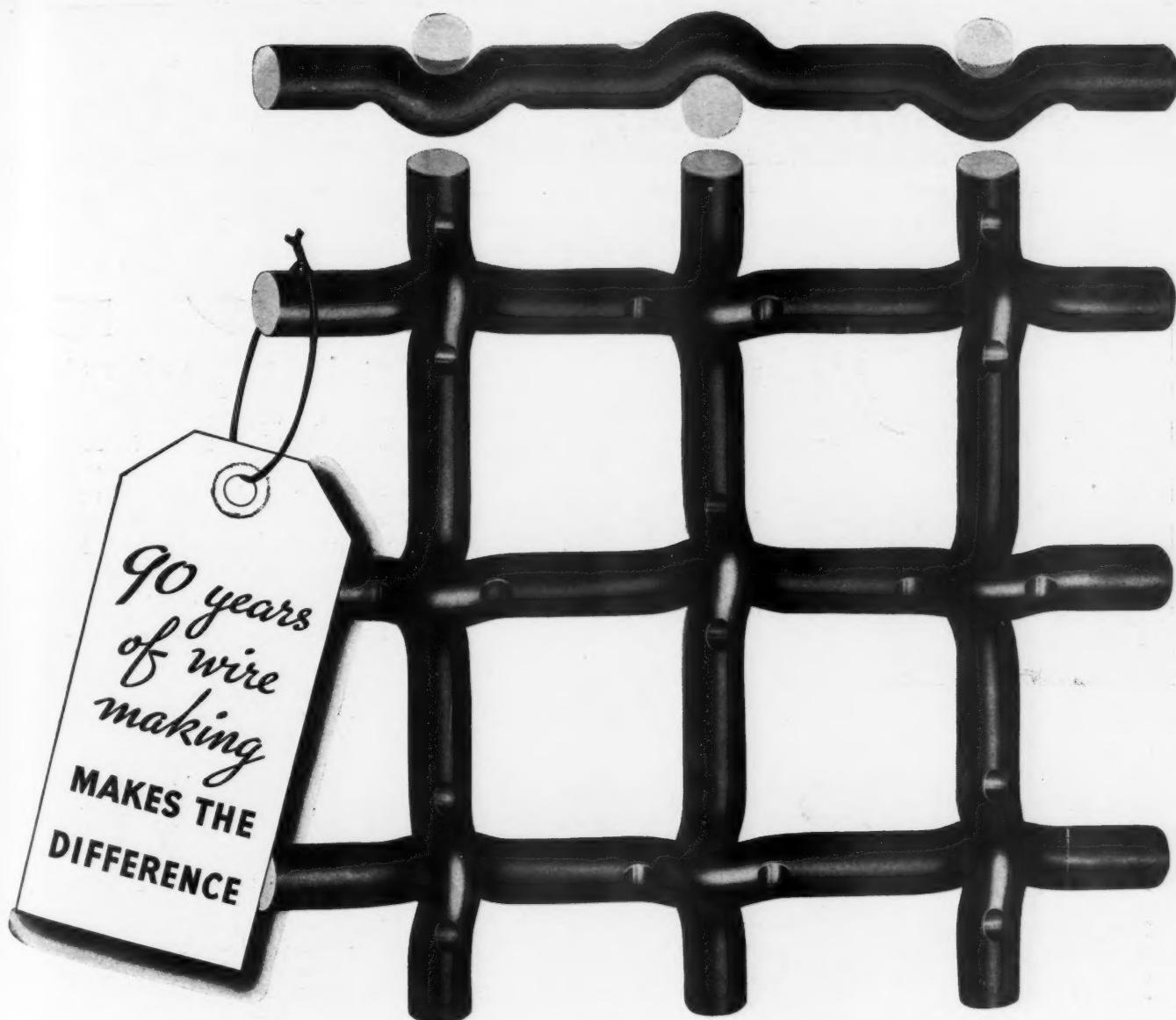
Yet bigger blasts—fewer, more economical and more profitable blasts—are only one way in which Cordeau-Bickford saves money . . . Learn about its other cost-saving features.
THE ENSIGN-BICKFORD Co., Simsbury, Conn. Estab. 1836.



CORDEAU
DETONATING FUSE
BICKFORD
ALSO SAFETY FUSE Since 1836

THE ENSIGN-BICKFORD COMPANY

CB-43



THAT'S THE STORY IN A Nutshell

OVER 90 years of experience in producing wire to meet a wide variety of severe requirements... made available by Roebling to help you solve your wire screen problems.

Many plants have lowered their screening costs by taking advantage of this experience. Why not let us put it to work for you?

Roebling Wire Screens are available in many

types and metals to meet a wide range of efficiency, vibration, and abrasion requirements.

We would welcome your request for our cooperation, further information, or a copy of our new Wire Screen Catalog.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N.J.
Branches in Principal Cities

ROEBLING Wire Screen



ROEBLING — MAKERS OF WOVEN WIRE FABRICS FOR OVER HALF A CENTURY

The Koehring Wheel Dumper for hauling · dumping · spreading



70·5

A fleet of the new "20 mile per hour" Koehring Dumptors, hauling, dumping and spreading on a road re-location project. Speed in spotting, speed in loading, quick get-a-way and instantaneous dumping—fast dirt-moving operations at new low-cost figures. Three speeds, forward or reverse, permit quick return to the loading unit—without turning or backing, resulting in shuttle service to any fill location.

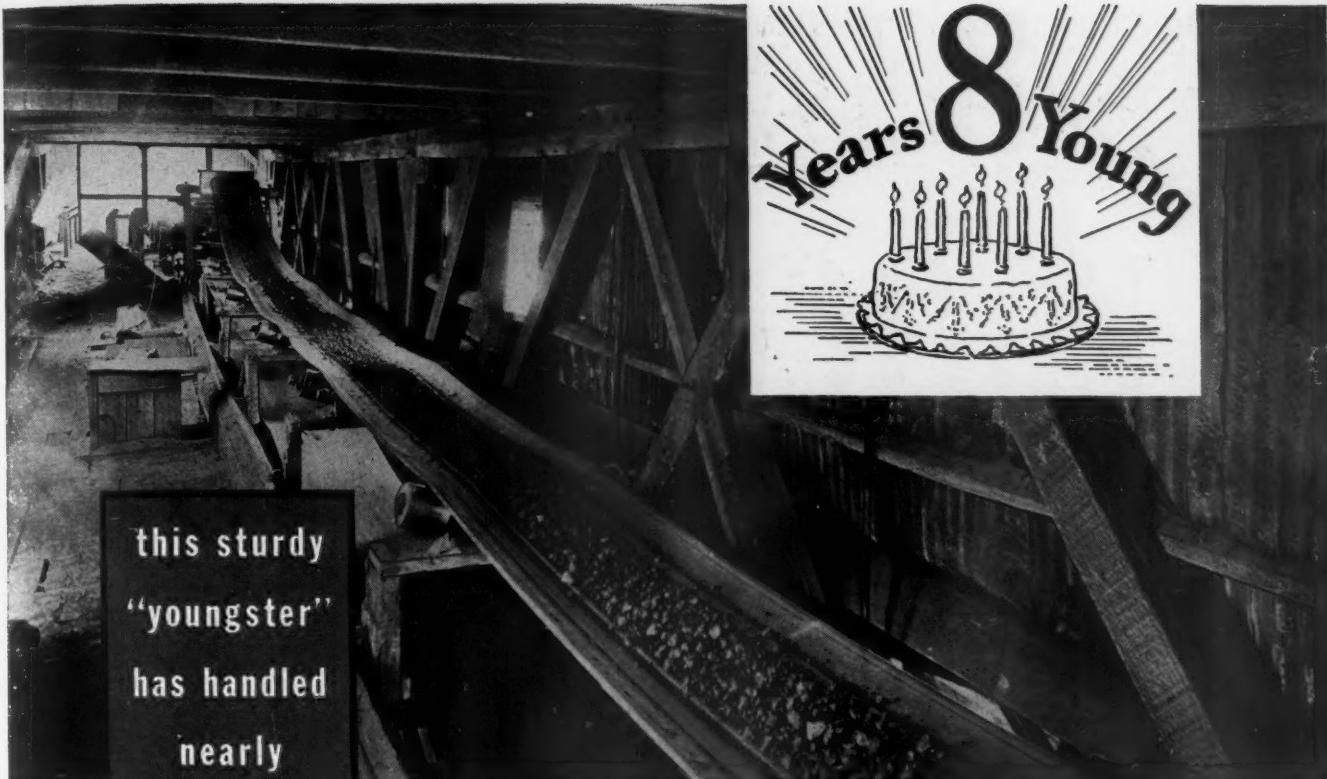


The Koehring Dumper dumps the load *where you want it*—right now. The "tough" spots are as easily and quickly filled as "topping out"—without time-losing "jockeying" or auxiliary equipment.



20·5 MILES per HOUR

KOEHRING COMPANY
Pavers · Mixers · Shovels · Cranes · Draglines · Dumptors · Mud-Jacks
3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN



this sturdy
"youngster"
has handled
nearly
2,000,000
barrels of
hot cement

-and still asks for more!

Back in 1927 this 740-ft. 18 inch 7 ply U. S. Hot Fines Conveyor Belt started its life of usefulness for the Spokane Portland Cement Company, Irvin, Wash.

By the fall of 1931 it had handled 1,235,000 barrels of cement at a temperature of approximately 235 degrees!

And it still is keeping everlastingly at it! That's stamina! That's performance! To date this belt has needed no repairs. The cover and the carcass are still in excellent condi-

tion — will undoubtedly handle many more thousands of barrels.

Impressive as this service record is to anyone who knows belts, it but reflects the outstanding quality of all belts manufactured by "U. S."

At any time, we will be glad to work with you to the speedy, practical solution of any belt problem that may arise in your plant, be it Conveyor, Elevator or Transmission belting. Address our nearest branch.



United States Rubber Company

Mechanical Goods Division

United States Rubber Products, Inc.

1790 Broadway New York, N. Y.

Stocks in all Industrial Centers

Is it a PARADE . . or a PROCESSION?



High maintenance costs will always slow up your march toward profitable tonnage

When today's production schedules demand fast, snappy action, why let your machines loiter along at a slow, profit-eating pace? In many mines, Texaco *tested* Lubricants are providing all types of power and production equipment with the stamina to step along briskly.

Wear saps the energy of the strongest machine. And you can't prevent it. But you can curb wear by choosing lubricants that are specifically suited to your operating conditions. Texaco *tested* Lubricants are available for turbines, compressors, shovels, conveyors, wire rope, trucks, mine cars. Each lubricant recommended by Texaco for a specific purpose has been *proved* efficient and economical by service tests under actual operating conditions.

Good oil alone is not enough

Here is where Texaco can do your men a valuable service. They know your operating conditions, and your machines. The Texaco engineer knows lubricants. He will work with your men so that they become interested in the importance of lubricants to profits. The Managements of many mines have found that this friendly cooperation has enabled their men to devise immediate and profitable improvements. This free service is yours for the asking.

THE TEXAS COMPANY

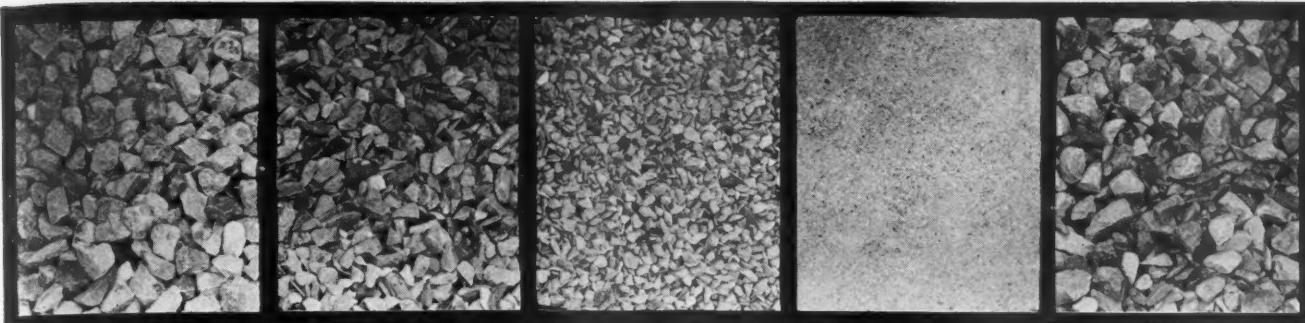
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Nation-wide distribution facilities assure prompt delivery



TEXACO *tested* LUBRICANTS

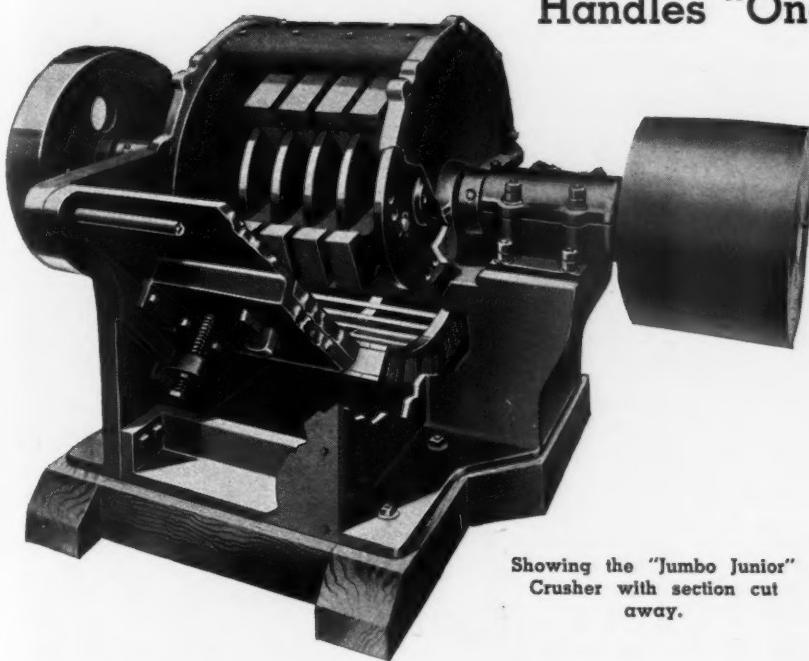
REFINERY TESTED FOR UNIFORMITY • • • SERVICE TESTED FOR ECONOMY



1 1/4" Macadam 3/4" Concrete Stone 1/2" Asphalt Binder Agricultural Limestone Traffic Bound Macadam

You can make them all with the "Jumbo Junior" Crusher

**Handles "One-Man" size
stone or screen rejects.**



Showing the "Jumbo Junior" Crusher with section cut away.

—and for 200 to 325 Mesh Grinding
let us tell you about
The Williams Roller Mill and Air Separator

Its advantages include:

1. Unusually accurate air separation.
2. Instantly changeable from 70% 100 mesh to 99.9% 325 mesh
3. Lower fine grinding costs.
4. More output per dollar of investment.
5. Ball-bearing operation.
6. STEEL castings (not cast iron) in important parts.

The "Jumbo Junior" is the ideal crusher for secondary crushing for large operations or as the whole crushing plant for medium size quarries as it handles hand-loaded rock or screen rejects and reduces to any of the sizes shown above in one reduction. Plants thus equipped are in position to supply any size on short notice.

Product is approximately cubular in shape with no slivers or slabs to form voids in concrete or bituminous mixtures. When so regulated, the percentage of fines is unusually low. Investigate this modern crusher. The small investment required will surprise you. Six sizes. Capacities 3 to 75 tons per hour. Larger Williams Hammer Crushers crush power shovel-loaded rock to commercial sizes in one reduction.

WILLIAMS PATENT CRUSHER & PULVERIZER COMPANY

800 St. Louis Ave. St. Louis, Mo.

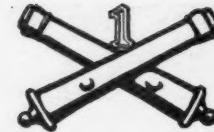
Chicago
37 W. Van Buren St.

New York
15 Park Row

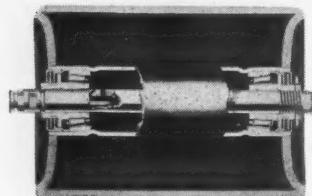
San Francisco
326 Rialto Bldg.



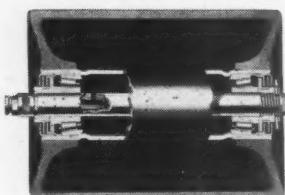
WILLIAMS
OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD
WILLIAMS
PATENT CRUSHERS GRINDERS SHREDDERS



EVERY BRANCH OF SERVICE



Tubular Steel



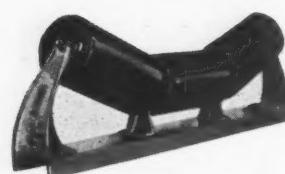
Unicast Grey Iron

Just as there is no idler superior in principle or construction to the Rex-Stearns Timken Idler—so no line is more complete.

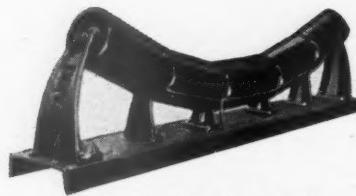
The standard Style 37—with Tubular Steel or Unicast Grey Iron Rolls—the Heavy Duty 57—the 31 and 52 with Trough Formed Self-Cleaning Base . . .

The 37 Rubber Covered Idler for the loading points. The low cost No. 39 Tubular Steel Troughing Idler . . . The No. 30 Self-Aligning Idler, for automatic belt alignment, and the No. 30 for machinery application, and the No. 35 Low Head Room Troughing Idler—also used for handling concrete. There are also other styles regularly used in industries other than the sand, gravel, stone and cement . . .

Write on the type that interests you—it pays to standardize on Rex-Stearns.



Rex-Stearns Timken Style No. 37 Troughing Idler.



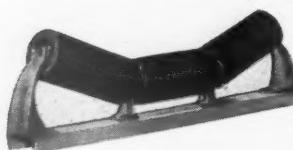
Rex-Stearns Timken Style No. 57 Heavy Duty 5-Pulley Troughing Idler.



Rex-Stearns Timken Style No. 31 Troughing Idler with Self-Cleaning Base.



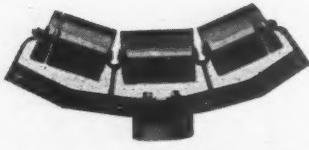
Rex-Stearns Timken Style No. 52 5-Pulley Troughing Idler with Self-Cleaning Base.



Rex-Stearns Timken Style No. 37 Rubber Covered Idler.



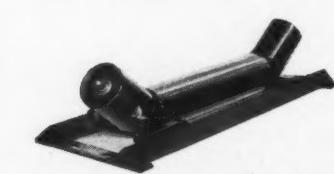
Rex-Stearns Timken Style No. 39 Tubular Steel Troughing Idler.



Rex-Stearns Timken Style No. 33 Self-Aligning Idler.



Rex-Stearns Timken Style No. 30 Machinery Application Idler.



Rex-Stearns Timken No. 35 Low Head Room Troughing Idler.

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CHAIN BELT COMPANY
REX CHAIN AND BELT CONVEYING

NITRAMON

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BLASTING COSTS *from Seven to Twenty per cent*

NITRAMON was announced to the trade January 22, 1935.

In sixty representative blasts to April 30, 1935—in quarries and stripping operations—one pound of NITRAMON has replaced an average estimated charge of one and one-quarter pounds of various grades of explosives.

From 7% to 20% savings in costs have been common.

Since its introduction to April 30, 1935—less than three months—more than 400,000 pounds have been ordered. In this short time, blasts have been made in dolomite, limestone, granite, sandstone, conglomerate, cement and traprock.

In addition to its economy of use, NITRAMON has other outstanding advantages:

1st. NITRAMON may be used with a high degree of safety. It really is not an explosive in the accepted sense of the word. It cannot be detonated by blasting caps, by Cordeau, by flame, by friction or by impact.

2nd. NITRAMON is waterproof. It is packed in tightly sealed metallic cans.

3rd. NITRAMON produces no headaches--contains no nitro-glycerine.

4th. NITRAMON will not freeze.

5th. NITRAMON loads quickly because of its convenient package.

A bulletin containing complete information on grades available and methods of use will be sent on request.

Packaged in cans, this new patented blasting agent when manufactured and sold by the du Pont Company is identified by the trade mark NITRAMON. It is packed in containers from 4 to 8½ inches in diameter and from 7 to about 65 pounds in weight.

E. I. DU PONT DE NEMOURS & CO., INC., Explosives Department, Wilmington, Delaware

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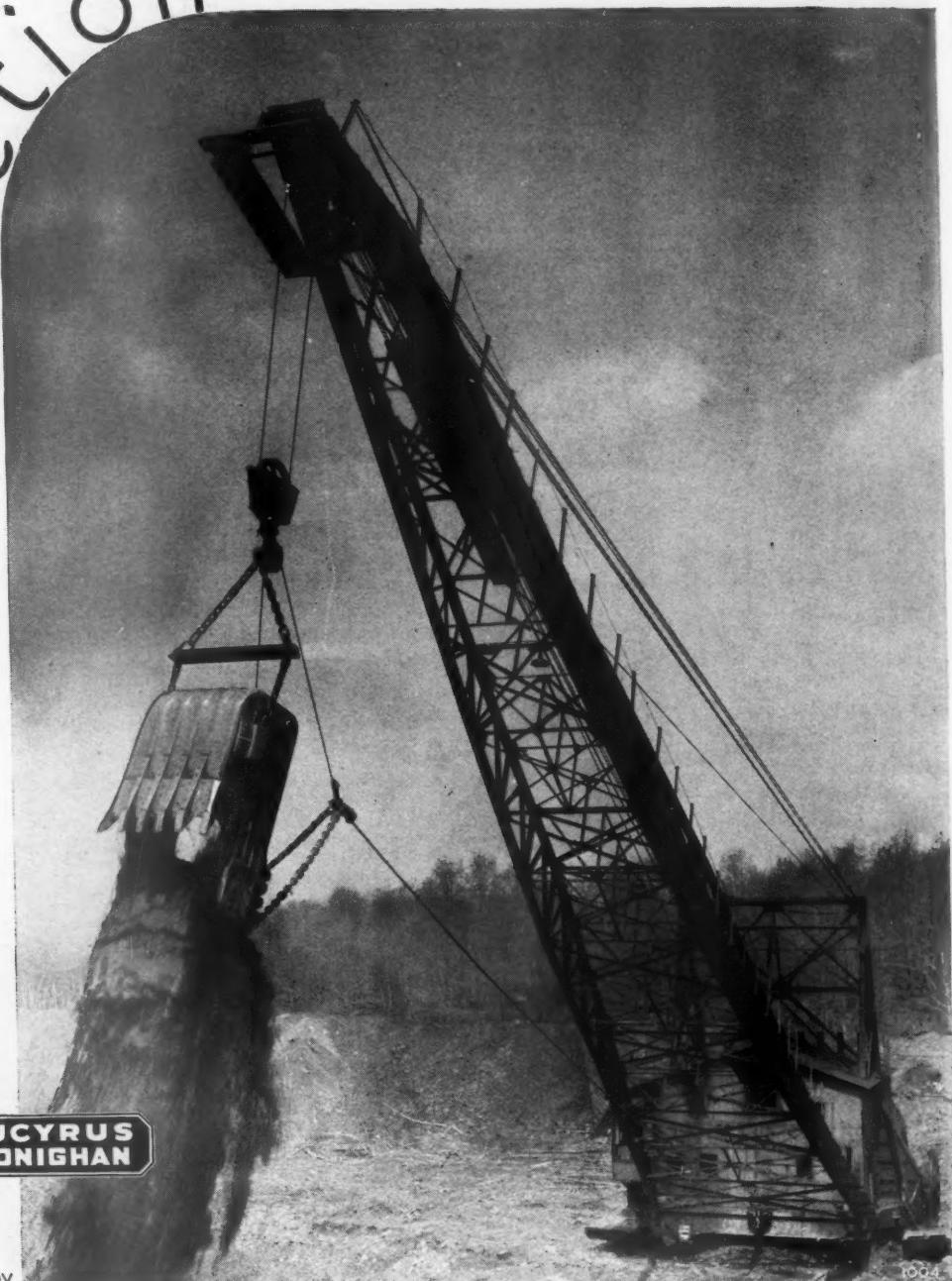
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NITRAMON

TRADE MARK
THE IMPROVED BLASTING AGENT

THE WALKER knows no idleness at the pit. After stripping, the machine is busy loading gravel on the cars or into hoppers. And, since the entire weight rests on the large circular base while digging, instead of on the treads, the machine may operate at the very edge of the bank. In case of a bank slide or cave-in, the Walker can instantly "about face" and step directly away. Manufactured by Bucyrus-Monighan Company, Chicago, Illinois.

action



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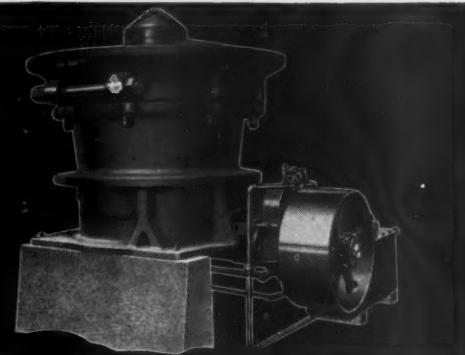
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DESIGNED TO MEET TODAY'S CONDITIONS—*profitably*

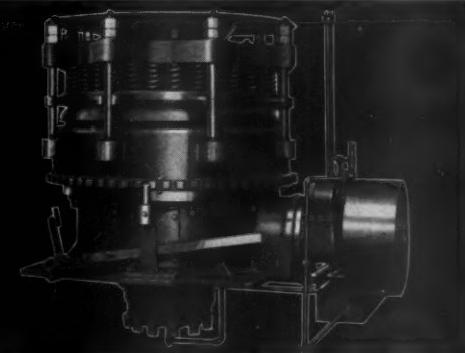
Modern in every sense of the word . . . designed to enable you to meet today's conditions and operate at a profit . . . this 3-piece combination of Telsmith equipment is a striking example of group efficiency.

PRIMARY BREAKER • FOR COARSE CRUSHING



Has a fixed shaft and sleeve eccentric. Short, compact, with steel frame and steel crown, it is the outstanding performer on hard rock. Cut steel drive gears and force feed oiling permit higher eccentric speeds and faster gyration. Larger head and concave diameters, with greater receiving and crushing area, allow faster feeding. Parallel pinch starts immediately, crushes full tilt all way down; guarantees bigger capacity. Write for Bulletin B-11.

GYRASPHERE CRUSHER • FOR FINER CRUSHING



The Telsmith GyraspHERE takes the trouble out of secondary crushing. Working at choke feed, it turns out a bigger tonnage and more cubical product—crushes finer, with low power consumption and up-keep. The reasons—spring relief, rotary head support, spherical head, unit spring design, anti-friction thrust bearings, pressure lubrication, different distribution of crusher pressures. Write for Bulletin Y-11.

PULSATOR • FOR EFFICIENT SCREENING



The Telsmith Pulsator screens crushed rock, sand, gravel, ore or coal...wet or dry.

Its circular movement produces a maximum screening action, uniform on every inch of the wire, on every deck, under any load. The toughest alloy steels, the finest anti-friction bearings and special labyrinth and piston ring steels (to protect working parts) give longer life and lower up-keep. Write for Bulletin V-11.

M-2

SMITH ENGINEERING WORKS
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605 Statler Bldg.	Boston, Mass.
412 Westinghouse Bldg.	Pittsburgh, Pa.
Milburn Mchy. Co.	Columbus, Ohio

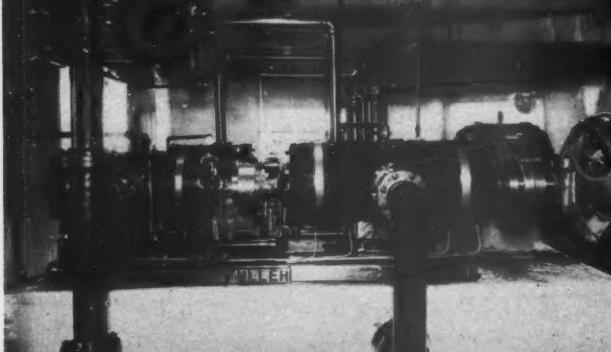
THREE TYPE H PORTABLE
FULLER-KINYON
CEMENT PUMPS

THREE SINGLE-STAGE
AND THREE TWO-STAGE
FULLER-ROTARY
COMPRESSORS

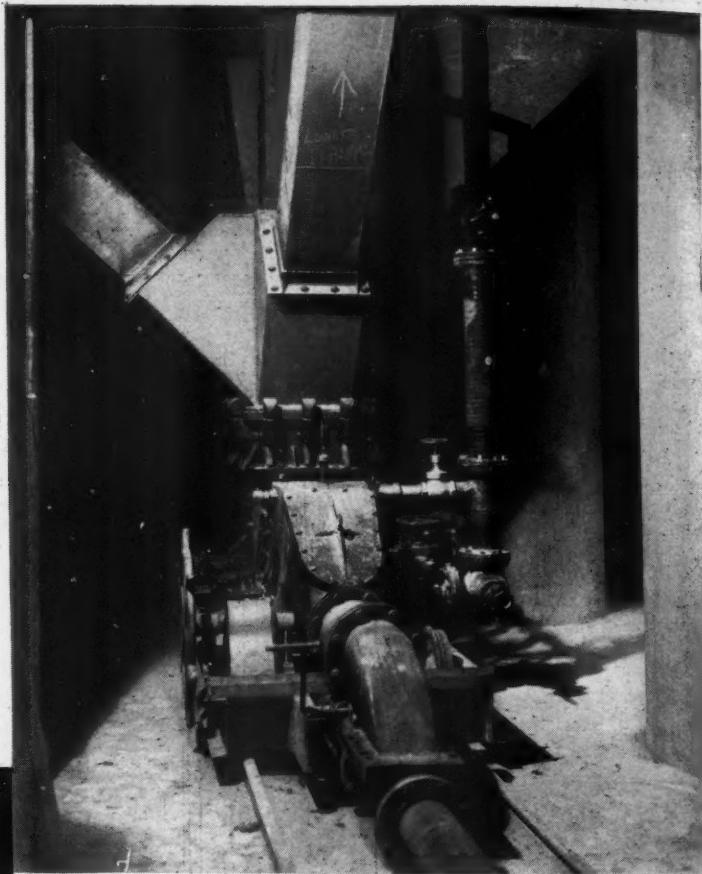
ONE OF PORTABLE
PUMPS BELOW THE SILOS



ONE OF THE SINGLE-
STAGE COMPRESSORS



TWO OF THE TWO-STAGE
ROTARY COMPRESSORS



AT THE NEW PLANT OF
NATIONAL
PORTLAND CEMENT CO.

cement is withdrawn from silos and conveyed to the packhouse by three Portable Fuller-Kinyon Pumps, travelling on parallel tracks below the bin spouts. This installation brings the number of the new Portable "H" Pumps in actual service up to fourteen. Like the stationary type, these new low pressure, low velocity pumps are showing remarkable power economy.

All of the compressed air for the plant is furnished by Fuller Rotary Compressors. Three single stage machines, one of which is shown at the left, serve the three pumps independently and also furnish air for the packhouse including the packer spill conveyors. Each has an actual free air delivery of 530 CFM at 720 RPM when compressing to 40 pounds gauge. The two-stage machines, shown at the bottom of the page, furnish air for conveying cement from mills to silos and for agitating slurry. Each has an actual free air delivery of 800 CFM at 720 RPM when compressing to 75 pounds gauge. A small two-stage unit serves the quarry with 232 CFM compressed to 100 pounds gauge.

Fuller Company
CATASAUQUA, PENNA. U.S.A.

Chicago: 1118 Marquette Bldg.

Paris: E. Constantin, 105, Rue Lafayette

Hamburg: Claudius Peters, Welhoff, Glockengiesserwall 2

Hercomite and Gelamite

the Proved explosives

Safety: 200,000,000 pounds of Hercomite-type powders and 26,000,000 pounds of Gelamite have been used in quarries and open-pit mines in all sections of the country, yet we have no record of a premature explosion caused by either a Gelamite- or a Hercomite-type powder. Hercomite and Gelamite are safe enough to make this record, but you can always make them explode when you want them to explode.

Performance: Hercomite for 20 years and Gelamite for six years have blasted out millions of tons of rock and ore — surely and efficiently. Hercomite and Gelamite attained leadership from real performance, utmost dependability, downright economy, and from the fact that in the Hercomite and Gelamite series are explosives suitable for most conditions.

Gelamite has proved that it is sufficiently water-resistant to meet most requirements.

Economy: Hercomite and Gelamite usually save up to 30% over older-type explosives they replace. But the greatest savings from their use come from superior fragmentation of rock and ore, sure detonation, and improved safety — all of which mean relatively safe, certain, economical, and uninterrupted operation.

HERCULES POWDER COMPANY
INCORPORATED
946 KING STREET
WILMINGTON, DELAWARE



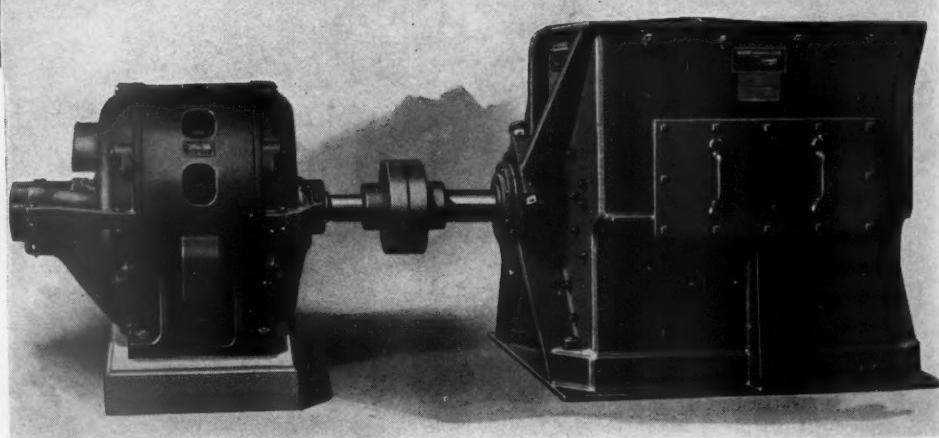
Making Concrete Sand at NORRIS DAM



Above—Norris Dam one-third completed. Photo taken 12-13-34.

BECAUSE of the excellent product made, a great saving resulted through the use of sand produced with Allis-Chalmers Pulverators by The Tennessee Valley Authority in the construction of Norris Dam. These machines are producing a granular product from dolomitic limestone, at the rate of 60 tons per hour with minus 3" feed and fully conforming with the specifications of the U. S. Government engineers. They are operated in closed circuit with Aero-Vibe screens producing two sizes of sand. These machines may be inspected at any time.

The Allis-Chalmers Pulverator is not just "another hammer-mill". It breaks material in an entirely different way. The hammers strike the material squarely and drive it squarely against a series of involute breaker plates reducing it to the desired size. Pulverators such as those operating at Norris Dam, are of welded steel construction with anti-friction bearings. They can be used on any non-abrasive material. Write the nearest Allis-Chalmers District Office for further information.



ALLIS-CHALMERS

— Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, U.S.A. —

LORAIN

Forged Steel Heat Treated

GRINDING BALLS

Grinding cement to the extreme fineness required by the increasingly difficult specifications for the finished product of high early strengths, results in lowered production of output and with increased costs per barrel.

Rigidity in the requirements of the finished cement specifications indicate the need of the best obtainable materials for GRINDING BALLS AND LININGS, to assist in maintaining the highest possible production with the lowest possible costs of renewals due to wear.

LORAIN GRINDING BALLS are manufactured to definite analysis in metals known for their qualities of resistance to wear in grinding, and they are heat treated to effect resistance to wear in accordance with the grinding service imposed by their use.

Your order for LORAIN GRINDING BALLS, or LININGS, is our obligation to effect satisfactory grinding service in your plant. Balls can be furnished promptly in the following diameters:

$\frac{1}{2}'' - \frac{5}{8}'' - \frac{3}{4}'' - \frac{7}{8}'' - 1'' - 1\frac{1}{4}'' - 1\frac{1}{2}''$
 $2'' - 2\frac{1}{2}'' - 3'' - 3\frac{1}{2}'' - 4'' - 4\frac{1}{2}'' - 5''$.

THE LORAIN STEEL CO.

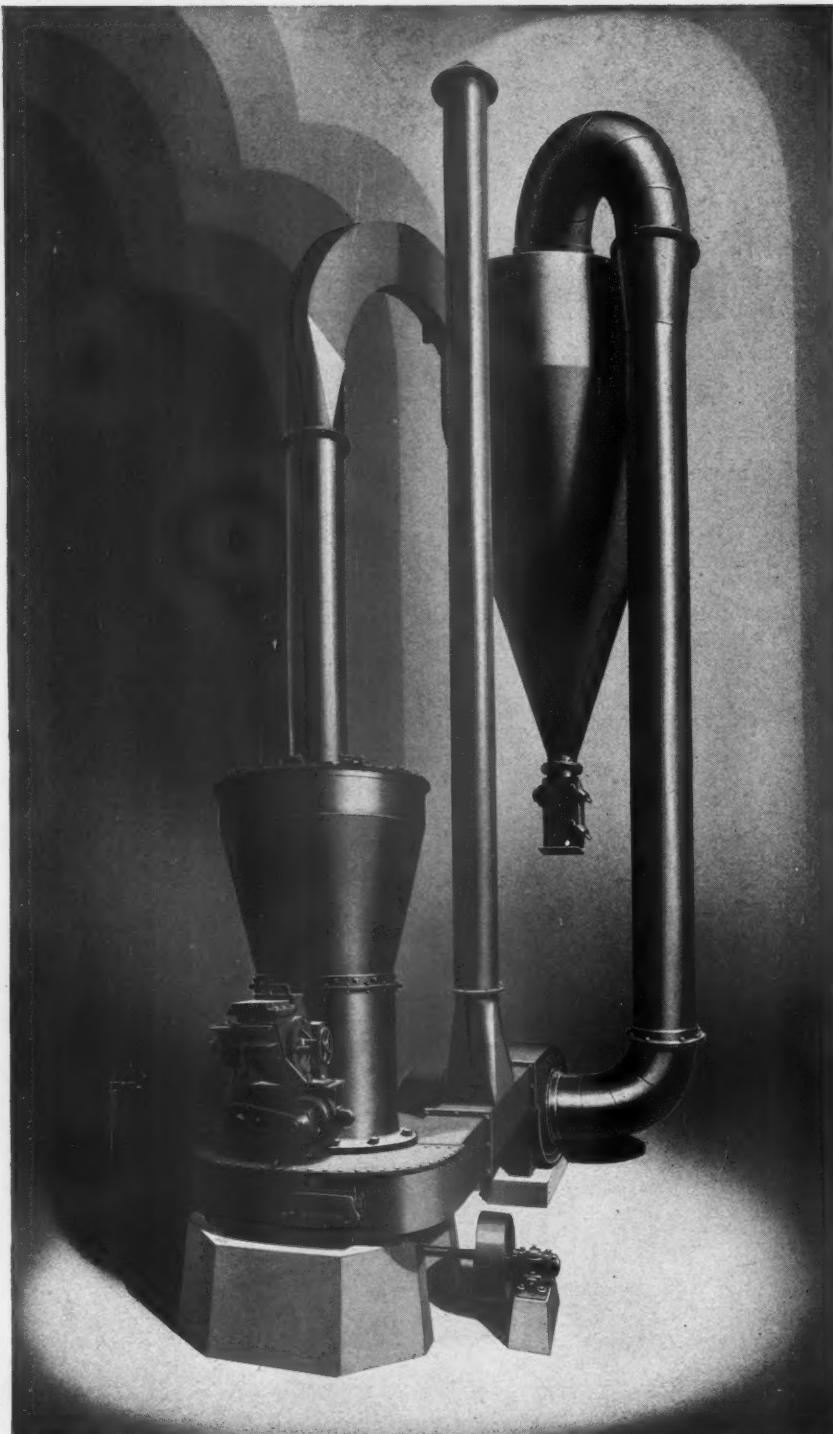
General Office: 545 Central Avenue, Johnstown, Pennsylvania

Sales Offices: Atlanta, Chicago, Cleveland, Houston, New York, Philadelphia, Pittsburgh and Denver

Pacific Coast Distributors: Columbia Steel Company, Russ Bldg., San Francisco, Calif.

Export Distributor: United States Steel Products Company, 30 Church St., New York City, N. Y.

MIDGET ROLLER MILL



MILL

This popular pulverizing unit assures the same low production cost in small plants, as the standard Raymond Roller Mills in large plants.

For its size and output, the Midget shows a higher efficiency rating than any other type of mill. It is often substituted for other small grinding units with advantages of lower power cost, easier control and freedom from mechanical troubles.

It has no equal for economy in pulverizing limestone, gypsum, clay, coal and carbon products. Where these materials contain moisture, it may be operated as a Kiln Mill for drying and grinding at the same time. The following typical uses show its wide range of application.

ZEOLITE—

This sodium silico aluminate material is successfully ground by a Midget Mill, equipped with a whizzer separator, to a fineness of 99.4% passing 300-mesh at 1,300 pounds per hour.

LIME—

Two grades of material are made by a Midget Mill with a double-cone separator. First, burnt lime is produced at 7,200 pounds per hour at better than 60% passing 100-mesh; Second, hydrated lime is pulverized to 97.6% through 200-mesh at 2,000 pounds per hour—both excellent records of performance for this machine.

If you have a grinding, separating or drying problem, just tell us your requirements—product, fineness, capacity—and we will recommend the proper equipment for your purpose.

Catalog sent on request.

Raymond Bros. Impact Pulverizer Co.
Division of Combustion Engineering Company, Inc.
1307 North Branch Street, CHICAGO
Sales Offices in New York and Los Angeles
Canadian Representative:
Combustion Engineering Corporation, Ltd., Montreal

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Pacific Coast Distributors:
Columbia Steel Company, Russ Building, San Francisco

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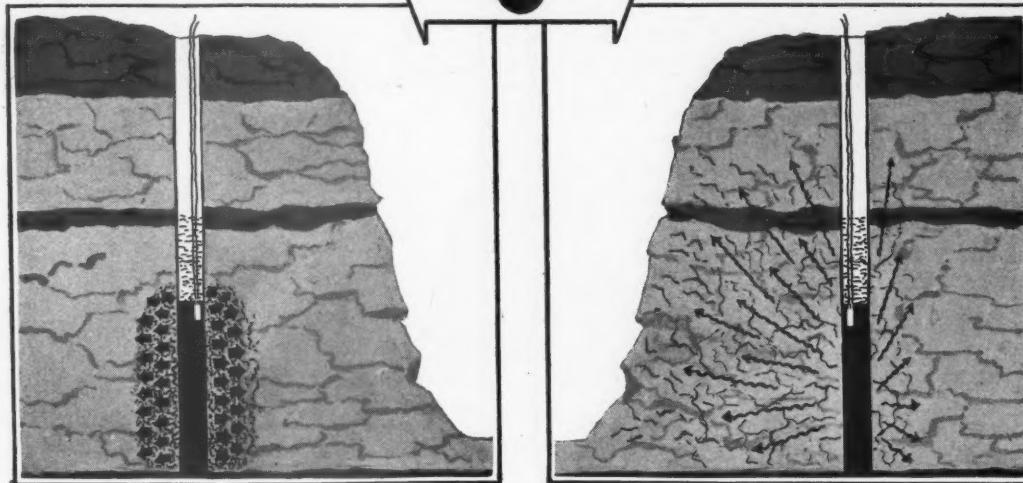
United States Steel  Corporation Subsidiary

DO YOU

Pulverize with explosives



Get action that gives favorable breakage with greater yardage



If you use an explosive with high brisant action, that is to say, a high combination of speed and strength that gives a grinding, shattering effect,—the result is that the explosive concentrates its action on a relatively small volume of rock and pulverizes rather than produces favorable fragmentation. Pulverizing uses up wastefully much of the explosive's energy.

Should you use an explosive with a heaving action, that is to say, it exerts just enough force just fast enough to permit its energy to spread over a larger volume,—the result is a pushing, straining effect that produces favorable rock breakage and greater yardage. Greater benefit is received from the explosive's energy.

In Apex, Atlas introduced for the first time a quarry explosive with Velocity Control to meet varying rock formations and quarrying methods. Atlas Apex is made in three strengths, with three velocities for each strength to provide a wide selection. This enables the quarryman to get the combination of strength and velocity that is best adapted to his rock formations and methods of blasting.

Experience has shown that better control promotes better results. Let the Atlas representative tell you more about Apex and better blasting.

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ATLAS

E X P L O S I V E S



Rock Products

CEMENT and ENGINEERING NEWS

With which is
incorporated

Founded
1896

Volume XXXVIII

Chicago, June, 1935

Number 7

Recovery Progress—Trends—Editorial Comment

WE ARE NOT among those rejoicing over the United States Supreme Court's annihilation of NRA and the Codes; although, along with most other thinking citizens, probably, we welcome a return to constitutional government and the curb on a tendency toward dictatorship that the decision implies. Always doubtful of the constitutionality of NRA and the codes, we did believe industry could utilize the lapse of congressional responsibility and prerogative to learn how to run its own affairs in a broader and more coöperative spirit, and with an eye to the public welfare as well as to profits. Some industries, and we believe those that ROCK PRODUCTS serves are among them, have learned to do this with more or less unanimity; others, unfortunately, took advantage of a civic obligation as though it were a license.

Fortunately, the Supreme Court decision does not close the door to industrial self-government, which we believe was sincerely the ultimate goal of those who determined the policies of NRA. The codes have now become what ROCK PRODUCTS has repeatedly said they must eventually become—*codes of honor*, rather than codes of law. Whether the Supreme Court had thrown them out as law or not, they never would have had much weight in industrial self-government until they were accepted as codes of honor, and lived up to because the current level of business morality justified them.

Situation Far from Hopeless

We do not consider the situation hopeless, in spite of the fact that voluntary "codes of ethics" were tried out in some of these rock product industries prior to the advent of NRA, unsuccessfully. The NRA lasted long enough to have convinced intelligent producers that cut-throat competition can be avoided, even in times of dire

lack of business; consequently many business failures, wage cuts and deflation generally can be (and have been) avoided by doing business according to rules of fair play.

The way out seems not so difficult. To our mind it would consist of so changing the anti-trust laws that industry may enter into agreements for self-government (for dealing collectively with labor and merchandising problems, especially) without danger of prosecution, so long as the professed purpose of NRA and the codes (the promotion of the public interest) is honestly adhered to. The burden of proof would then be on the government to show that such agreements were for collusion (an agreement for a dishonest purpose), and not for the ultimate welfare of the country as a whole, as industry would contend.

It appears that Congress can do this constitutionally either by directly amending the anti-trust laws to permit such agreements, or by a new law containing the broad, essential features of a code of fair competition, with permission to a regularly organized industry to adopt "interpretive rules" for making such an over-all code specifically applicable to its own problems. The difficulty has been, that so far as known, no one has offered a specific suggestion for amending the anti-trust laws, nor has any one sufficiently digested the several thousand code rules of fair competition to be able to draw up an all embracing set of rules which might be made an act of Congress. However,

neither is impossible to a group of intelligent business men.

Ex-President Hoover, who certainly did a great deal to promote trade and industrial associations and paved the way for greater progress in industrial self-government through adoption of commodity standardization and voluntary codes of ethics, recently said: "The whole idea of ruling business through

Frank Walker, head of the Division of Information and Applications, with a map of the U.S.A. showing where some of the four billion dollar public works and relief money may be spent

Acme Photo



code authorities with delegated powers of law is un-American in principle and a proved failure in practice. The codes are retarding recovery. They are a cloak for conspiracy against the public interest. They are and will continue to be a weapon of bureaucracy, a device for the intimidation of decent citizens. * * * The beneficent objectives of a greater social justice and the prevention of sweating labor, child labor, and abuse in business practices should be and can be better attained by specific statutory law."

In view of the Supreme Court decision in this NRA case and in a previous case where Congress tried to abolish child labor by federal statute, there is considerable doubt that Congress can legislate directly on hours of labor and rates of pay in local industries. But it may be possible for Congress to pass legislation which will permit any industry to make voluntary, binding agreements among its own members to cover these and other code regulations. The non-coöoperator would eventually be driven into the fold by pressure of public opinion, or by the demands of his labor to share the same terms enjoyed by similar labor throughout the industry.

While we do not agree with Mr. Hoover that the code authorities have retarded recovery, or that they have generally been used to cloak conspiracy against the public interest, we must admit that they *could be* so used; and we must admit that there is something fundamentally illogical and indefensible in turning over the internal government of an industry to men whose only interests in that particular industry are and must be essentially selfish. However fair and just a business man may be, in his own and in others' estimation, he can not be expected to deal entirely disinterestedly with acts or offenses of his competitors which affect vitally his own business interests.

"Self-Government" of Industry Should Be Impartial Government

Too often, in industrial self-government, so-called, as in all government, the feeling is "to the victors belong the spoils," which is another way of saying "to the successful belong the spoils, or the profits." That sentiment is all right in business if *successful* is adequately and fairly defined. But to many successfulness in business still means merely to be the most powerful, or to be the most ruthless (tactfully called "aggressive" in many instances).

Consequently we can not blame the so-called small business man, who generally had no membership on a code authority, and not much if any voice in this so-called industrial self-government, if he has hesitated to trust his big competitor, who did have code influence, with the future of his business. Public sympathy naturally is always with this little fellow; and since he is numerous he will always find plenty of champions in politics, if he makes enough noise, whether he is actually hurt or not. Of course, that's what happened, and there is not now any great popular demand for a new NRA—not enough to justify an attempt to amend the constitution, even if the New Dealers attempt it, as the President is said to have in mind in his chagrin over the Supreme Court decision.

The answer appears to be that "self-government" in

industry should be such that infractions of codes, or of set rules for business morality, should *not* be a matter for a man's competitors to judge, but for the calm and unprejudiced examination and finding of an impartial body of men—business experts if you will—a supreme court for that industry, or for a group of industries. This court (or whatever you want to call it) need not, and in our opinion should not, be government appointed. It should be free from politics and from politicians. It should be of the industry's own choosing, but should *not* be composed of men actively engaged or interested in any particular concerns in the industry whose activities they are to oversee. Its decisions need not have legal weight—must in any event be subject to final confirmation or rejection by the federal courts or the Federal Trade Commission; its position should be that of arbiter and impartial adviser to the industry, its friend at court, when necessary, and representative of the public interest as well as of the industry interest.

Cement Industry's New Code an Example

It is presumed that the drafters of the Amended Code for the Cement Industry, abstracted elsewhere in this issue, had some such a court or board in mind when they wrote the contract provisions to give bond to one another in the form of promised liquidated damages for breaches of fair business practices. This contract provides for a decision by "an impartial fact-finding board, the members of which shall be nominated by the Code Authority or by the parties to this contract, * * * the said board to receive and hear all evidence * * * its decision to be final and not subject to review." This, of course, is not intended to shut the courts to members of the industry, which would not be lawful; but it is to be hoped that such a board's decisions would be so sound and fair as to deprive a disappointed code violator of a just case in a court of law, or, as might be, of just grounds for an appeal to the Federal Trade Commission. Obviously, such a board would inspire far more confidence that a code would be impartially interpreted and administered than any code authority composed of active members, or competitors, in an industry.

May be something like this can be worked out for all industry, and the "fact-finding" board, or supreme court, of an industry can be made to take the place of the present code authorities. Membership on such a board (it probably would be impolitic to refer to it as a court, although it should have a court's functions so far as the industry is concerned) should be an all-time job for the very highest type of men to be had: economy and efficiency would result from having the same board serve several closely allied industries.

In the meantime it is to be hoped that no industry will so disgrace itself or endanger the peace and welfare of the nation as to scrap its code and revert to jungle warfare merely because it is again permissible. A greater responsibility than ever rests on industrial leaders to prove their real leadership; to prove that industry has the moral stamina to do what is right by its labor and its public without having to lean on government for support—for that is self-government.

Construction News and Outlook

STATISTICS compiled by the *United States News* show why the construction industry suffers. In 1929, the total of new securities issued amounted to \$9,420,000,000, most of which went to productive purposes. This, of course, was not money, in the sense of currency; it was credit that the people of this country could provide under prosperous conditions. Of this 9 billions only 15% were government securities (state and local, as the federal government issued no securities in 1929). In 1934 some \$6,180,000,000 in new securities were issued, 97% of which were government. In short, in the past five years the government has come to monopolize both the securities and construction markets. Of the almost 6 billion spent in 1934 by the government (federal, state and local) probably not more than one-third was spent for real honest-to-goodness construction.

This year, although commentators predict it will be late fall before things really get started in earnest, the construction outlook is far more favorable because (1) private capital is coming back to the construction market, slowly but surely; (2) residential building is increasing rapidly (while financed by government in many cases, it is nevertheless private construction); (3) appropriations for highways, grade crossing elimination and federal government buildings, at least, will be spent through normal business channels; and a maximum of 130 hours a month may be allowed workers.

To the projects in these classes of construction the President's schedule of wages (for unskilled labor from \$55 to \$19 a month) will not apply, for such work will be done by contract, and the contractor will pay the prevailing wage. The President's scale of wages will apply to a kind CWA organization, which has accounted already for the spending of millions for raking up leaves, shoveling dirt from one side of the road to the other and back again, etc. The President says he wants some other kind of work relief, if possible.

The low wage scales for this new CWA, or whatever it may be called, ought to prove a good thing for industry, because it should stir up local agitation for having all construction work done by contractors, who will not be limited to such a low scale. Presumably this is in line with what the President wants, for he has said that he did not want the government pay scale to be competitive with that of industry.

State Programs

While the federal government has been negligent in planning for a long-range public works program, a few of the states are waking up to the possibilities. A good example is Maryland, which, like a few of the other Eastern States, has practically completed construction of all its originally contemplated federal-aid and state highway sys-

tem. Nevertheless, careful planning shows that 906 miles of road, 60 bridges and 57 grade crossings can be profitably constructed in the realignment and widening of existing highways. And Maryland is a small state.

Wisconsin is another state which is taking its public works program seriously. Governor La Follette has come forward with a plan to spend \$100,000,000 of federal money along with an equal amount of state funds for a list of state-wide projects assembled under state supervision. His plan was accepted in Washington with alacrity. Thus he is several jumps ahead of other states whose public works requests upon the national government are as unorganized as their methods for spending the money if and when the federal government sees fit to allot it. The federal government is attempting to promote the Wisconsin idea by decentralizing the new public works organization.

Billion Already Approved

On May 22, the President announced he had given approval to the initial allocation of more than a billion dollars of the 4 billion dollar works relief program. The Works Allotment Board's allotments, totaling

\$1,090,953,200, were for highway construction, grade crossing elimination, army engineers, federal housing and slum clearance, and rural resettlement. The President estimated that mandatory allotments to such projects as the civilian conservation corps, highway and grade crossing elimination will constitute from 25% to 50% of a state's work relief funds. He said that in distributing the work relief money the administration has the problem of making the money, to which each state is entitled on a basis of the relief population, go around. Division of the 3,500,000 employables into the 4 billion dollars would give each worker about \$1,100.

The allotment to the U. S. Bureau of Public Roads was \$500,000,000—\$200,000,000 for highway construction; \$200,000,000 for grade crossing elimination; \$100,000,000 for previously incurred obligations under the Hayden-Cartwright act of 1934—the regular federal aid appropriation. It is expected to get some of this construction under contract before July 1—incidentally about the only public work that is ready to go ahead, except what the enterprising state of Wisconsin has planned for, but Wisconsin has still to act on the state's share.

DISTRIBUTION OF HIGHWAY AND GRADE-SEPARATION FUNDS UNDER ALLOTMENTS APPROVED MAY 16, 1935

State	Highways, Roads, and Streets	Highway- Grade Separation and Protection	Total	Unappropriated Balance Under the Hayden- Cartwright Act
Alabama	\$4,151,115	\$4,034,617	\$8,185,732	\$2,129,921
Arizona	2,569,841	1,256,099	3,825,940	1,320,967
Arkansas	3,352,061	3,574,060	6,926,121	1,714,024
California	7,747,928	7,486,362	15,234,290	3,966,103
Colorado	3,395,263	2,631,567	6,026,830	1,743,003
Connecticut	1,418,709	1,712,684	3,131,393	727,434
Delaware	900,310	418,239	1,318,549	461,697
Florida	2,597,144	2,827,883	5,425,027	1,330,671
Georgia	4,988,967	4,895,949	9,884,916	2,556,745
Idaho	2,222,747	1,674,479	3,897,226	1,138,743
Illinois	8,694,009	10,307,184	19,001,193	4,460,700
Indiana	4,941,255	5,111,096	10,052,351	2,544,481
Iowa	4,991,664	5,600,679	10,592,343	2,559,180
Kansas	4,994,975	5,246,258	10,241,233	2,558,837
Kentucky	3,726,271	3,672,387	7,398,658	1,909,155
Louisiana	2,890,429	3,213,467	6,103,896	1,481,966
Maine	1,676,799	1,426,861	3,103,660	855,793
Maryland	1,750,738	2,061,751	3,812,489	905,029
Massachusetts	3,262,885	4,210,833	7,473,718	1,675,237
Michigan	6,301,414	6,765,197	13,066,611	3,226,284
Minnesota	5,277,145	5,395,441	10,672,586	2,712,775
Mississippi	3,457,552	3,241,475	6,699,027	1,770,113
Missouri	6,012,652	6,142,153	12,154,805	3,086,870
Montana	3,676,416	2,722,327	6,398,743	1,884,867
Nebraska	3,870,739	3,556,441	7,427,180	1,982,182
Nevada	2,243,074	887,260	3,130,334	1,151,178
New Hampshire	945,225	822,484	1,767,709	484,731
New Jersey	3,129,805	3,983,826	7,113,631	1,610,439
New Mexico	2,871,397	1,725,286	4,596,683	1,470,850
New York	11,046,377	13,577,189	24,623,566	5,663,960
North Carolina	4,720,173	4,823,958	9,544,131	2,420,470
North Dakota	2,867,245	3,207,473	6,074,718	1,469,483
Ohio	7,670,815	8,439,897	16,110,712	3,932,506
Oklahoma	4,580,670	5,004,711	9,585,381	2,342,590
Oregon	3,038,642	2,334,204	5,372,846	1,548,907
Pennsylvania	9,347,797	11,483,613	20,831,410	4,795,394
Rhode Island	989,208	699,691	1,688,899	507,286
South Carolina	2,702,012	3,059,956	5,761,968	1,385,477
South Dakota	2,976,454	3,249,086	6,225,540	1,523,821
Tennessee	4,192,460	3,903,979	8,096,439	2,151,495
Texas	11,989,350	10,855,982	22,845,332	6,145,626
Utah	2,067,154	1,230,763	3,297,917	1,066,345
Vermont	924,306	729,857	1,654,163	474,003
Virginia	3,652,667	3,774,287	7,426,954	1,882,693
Washington	3,026,161	3,095,041	6,121,202	1,553,206
West Virginia	2,231,412	2,677,937	4,909,349	1,140,167
Wisconsin	4,823,884	5,022,683	9,846,567	2,470,918
Wyoming	2,219,155	1,360,841	3,579,996	1,143,856
Dist. of Columbia	949,496	410,804	1,360,300	474,889
Hawaii	926,033	453,703	1,379,736	486,921
Eng. & Adm. Res.	5,000,000	4,000,000	9,000,000	.....
Totals	\$200,000,000	\$200,000,000	\$400,000,000	\$100,000,000

Cement Industry's NRA Code Could Be Enforced Without NRA

IN VIEW of the Supreme Court decision of May 27, and Donald R. Richberg's subsequent announcement that the Government would cease all attempts to enforce NRA codes, the Amended Code for the Cement Industry, which went into effect on May 21, may be of academic interest only. Nevertheless, it points the way out for those industries which are enough sold on codes of fair competition to carry them out voluntarily, with the knowledge, of course, that their way of doing it may subject them to prosecution under the anti-trust laws.

Liquidated Damages

The cement industry's amended code is to all practical purposes a new code, which contains this interesting Article VII:

SECTION 1. Recognizing that violation of any provision of this Code by a Member of the Industry will disrupt the normal course of fair competition in the Industry and cause serious damage to other Members of the Industry, and that it will be impossible to determine accurately the amount of such damage to any Member or Members of the Industry, it is hereby provided that any Member of the Industry may enter into an agreement with any other Member or Members of the Industry providing for payment of liquidated damages by any party thereto upon violation by him of any provision of the Code; provided, however, such agreement shall become effective and binding upon the parties thereto only after the execution thereof shall have received the consent of the National Recovery Administration. It is further provided that Members of the Industry desiring to do so may enter into a contract substantially in the form of Exhibit "D" appended to this Code.

SECTION 2. Violation of such a contract shall not in any sense be deemed a violation of this Code within the purview of Sections 3(b), 3(c) and 3(f) or other provisions of the Act. Rather, it is intended in this Article that the force and effect of said contract will be derived from the individual and private action of the parties and not from any provision of this Code or of the Act, or any rules and regulations prescribed pursuant thereto.

While not entirely grammatical, the purpose and intent of the article quoted is clear enough. It really puts the genuineness of the industry's desire for a real code, with teeth in it, fairly up to the members of the industry, for all it needs, whether NRA continues in its present form or not, is the signatures of the members of the industry. Our guess is that the time is not ripe to get the signatures of an overwhelming majority. The industry members may have to go through one or two more price wars to work up to the point of giving their bonds to one another, to assure their good behavior.

The form of contract referred to above is this:

Liquidated Damage Agreement

In consideration for the act of others in making similar agreements and for substantial benefits and other valuable consideration, the receipt of which is hereby acknowledged, each party to this contract covenants and agrees with every other party hereto, and the Treasurer of the Code Authority for the Portland Cement Industry as an individual, that:

1. If found guilty of violation of any provision of the Code of Fair Competition for the Portland Cement Industry in the manner provided in Paragraph 2 hereof, he will pay to the Treasurer of the Code Authority, as an individual and not as Treasurer, in trust, as and for liquidated damages, amounts indicated as follows:

(a) For the violation of any wage provision an amount equal to the difference between the wages which have been paid and the wages which would have been paid if the Member had complied with the applicable provision of the Code; provided, however, that any such payments shall not relieve the Member from his obligation to make equitable restitution to his employee or employees.

(b) For the violation of any hour provision, an amount equal to the wages payable for the overtime at the regular rate payable to the employee or employees who worked overtime.

(c) For the violation of any provision of the Code (other than wage or hour provisions) involving a transaction incidental to or connected with a sale of any product of the Industry, an amount equal to per cent (%) of the actual selling price of the product sold in violation of any such provision, or of the price at which the product should have been sold under the Code, if determinable, whichever is the higher.

(d) For the violation of any provision of the Code (other than wage or hour provisions) not involving a transaction incidental to or connected with a sale of any product of the Industry.

Note: The amount of liquidated damages must be correlated reasonably to the probable injury.

2. For the purposes of this contract, violation of any provision of the Code by a party hereto, and his or its liability for liquidated damages herein stipulated shall be determined by an impartial fact-finding board, the members of which shall be nominated by the Code Authority or by the parties to this contract, with the approval of the N. I. R. Board, consisting of the following: Said board shall receive and hear all evidence submitted, in a fair manner, and shall render its decision in the form of written findings of fact and conclusions based thereon. Said decision shall be final and not subject to review.

3. Each party to this contract hereby assigns, transfers, and delivers to the Treasurer of the Code Authority, as an individual, and not as Treasurer, in trust, all rights and causes of action whatsoever which shall hereafter accrue to such Member for such liquidated damages by reason of any violation of the Code by any other party, and hereby designates and appoints the Treasurer of the

Code Authority, as an individual, and not as Treasurer, the true and lawful attorney in fact of such party to demand, sue for, collect and receipt for any and all amounts which shall be owing to such Member in respect for any such right or cause of action, and to compromise, settle, satisfy, and discharge any such right or cause of action, all in the name of such Member or in the name of the Treasurer of the Code Authority, as an individual, and not as Treasurer, as he shall elect. All rights of any person who shall at any time be the Treasurer in respect to any amount which shall be payable to him because of the commission by any employer of any act constituting a violation of said Code, shall pass to and become vested in his successor in office, as an individual, and not as Treasurer, upon the appointment of such successor.

4. All liquidated damages paid to or collected by the Treasurer of the Code Authority pursuant to the provisions of this contract shall be utilized by him in the payment of Code expenses to the extent indicated and authorized in the budget for the Code Authority.

5. The Treasurer of the Code Authority, as an individual, and not as Treasurer, by accepting office accepts the trusts established by this contract and agrees to perform the duties of trustee hereunder until his successor in office may be appointed.

6. Any Member of the Industry may become a party to said contract by written notification to said Treasurer of the Code Authority of the adoption of and assent to the terms hereof.

7. Except as provided in Paragraph 3 above, nothing contained herein shall be construed or applied to (a) deprive any Member of the Industry, employee or other person of any right or cause of action arising out of this Code, or (b) relieve any Member of the Industry from any contractual or legal obligation arising out of such Code or of the Act or otherwise.

8. This contract may be terminated by vote of two-thirds (2/3) of the parties hereto, such termination to take effect immediately upon notice in writing to said Treasurer of the Code Authority; provided, however, such termination shall not relieve any member from payment of liquidated damages due as a result of any violation committed prior to said termination; provided, further, that such termination shall not be deemed to constitute a defense in any proceeding instituted pursuant to any provisions of the Act, any rules and regulations issued pursuant thereto, or any provisions of the Code.

9. Anything in this contract to the contrary notwithstanding, upon the affirmative vote of not less than seventy-five per cent (75%) of the parties hereto, said parties may waive any liability for liquidated damages arising under this contract; provided, however, such waiver shall not constitute a defense in any proceeding instituted pursuant to any provisions of the Act, any rules and regulations issued pursuant thereto, or any provisions of the Code.

10. No suit shall be brought for the collection of liquidated damages after one (1) year from the date of the decision rendered as provided in Paragraph 2 above.

Code Revisions

The new code provides for a 40-hour week, instead of 36 hours with a 42-hour maximum. Rates of wages are not changed. The articles on increase in productive capacity and cost protection in the original code are eliminated from the new one.

The method of open price filing has not been essentially changed, except that the filing is done with a confidential agency instead of with the Code Authority. The wording has been clarified. Section 4 of the new code provides that "no member of the industry shall enter any agreement, understanding, combination or conspiracy to fix or maintain price terms, nor cause or attempt to cause any member of the industry to change his price terms by the use of intimidation, coercion, or any other influence inconsistent with the maintenance of the free and open market which it is the purpose of this article to create."

Section 6 of the same article provides that no member of the industry may sell except on a legally binding contract, and (Section 7) copies of all such contracts must be filed with the agent of the code authority. Section 8 provides that the producer must notify the agent of the code authority of the completion of the contract. Section 9 provides that an extension, renewal, revision or modification of a contract is a "new contract" within the meaning of this article.

Trade Practices

Trade practice regulations are about as complete as can be conceived of to prevent many abuses of the past. While they may now be of academic interest only, it is worth while to reprint them on that account. Also, let the reader bear in mind that they could be enforced through the "liquidated damages" article, without the help of NRA, if cement manufacturers are brave enough to put their names on the dotted line.

Article IX

SECTION 1. The following trade practices are specifically declared to constitute unfair methods of competition between Members of the Industry, and no Member of the Industry shall use or engage in any of them, either directly or indirectly, through any officer, agent, affiliate or employee. Engaging in any one or more of these or any further trade practice provisions which hereafter may be established as unfair, on recommendation by the Code Authority approved by the N. I. R. Board after such hearings as it may prescribe, shall be deemed to be in violation of this Code.

SEC. 2. No Member of the Industry shall give, permit to be given, or directly offer to give, anything of value for the purpose of influencing or rewarding the action of any employee, agent, or representative of another in relation to the business of the employer of such employee, the principal of such agent or the represented party, without the knowledge of such employer, principal or party. This commercial bribery provision shall not be construed to prohibit free and general distribution of articles commonly used for advertising except so far as such articles are

actually used for commercial bribery as hereinabove defined.

SEC. 3. Imitating or simulating any design, style, mark or brand owned by any other Member of the Industry, provided that nothing herein shall prevent any Member from using any design, style, mark or brand with the consent of the owner.

SEC. 4. Modifying or cancelling in whole or in part, or permitting the modification or cancellation in whole or in part, of any contract of sale of any product for the purpose of having the effect of effectuating a new contract with the buyer when the effect of such modification or cancellation is to create an advantage in price terms for a Member of the Industry or to violate any provision of this Code.

SEC. 5. Knowingly inducing or attempting to induce the breach of any existing contract (including specific sales orders) between any other Member of the Industry and his customer or his source of supply; or interfering with or obstructing in any manner the performance of contractual duties or services between a Member of the Industry and his customer.

SEC. 6. Knowingly selling or offering to sell products of Industry for specific projects or period requirements to a purchaser with whom another Member of the Industry has a contract to furnish products of the Industry for the same requirements without first having taken the following steps: (a) Filing with the Code Authority proof that he has been requested by the customer to furnish such products for such requirements, and (b) notifying said other Member of the Industry of his intention to sell products to such purchaser.

SEC. 7. Disseminating, publishing or circulating any false or misleading information relative to any product or price for any product of any Member of the Industry, or the credit standing or ability of any Member of the Industry to mine or quarry raw materials, or manufacture or sell or deliver products of the Industry.

SEC. 8. No Member of the Industry shall knowingly withhold from or insert in any quotation, contract, or invoice, any statement, the withholding or insertion of which makes such quotation, contract, or invoice inaccurate in any material particular.

SEC. 9. Making any sale or contract of sale of any product of the Industry under any description which does not fully describe such product in the nomenclature customarily used in the Industry.

SEC. 10. Secretly paying or allowing rebates, refunds, commissions, credits, unearned discounts, excess allowances, special services or privileges, whether in the form of money or otherwise, to certain purchasers which are not extended to all purchasers under similar circumstances for the purpose of influencing a sale.

SEC. 11. Permitting, directly, or indirectly, the consummation of any sale made with the intent, or having the effect, of violating the provisions of the Act and of this Code.

SEC. 12. Aiding or abetting any person, firm, association or corporation, directly or indirectly, in any practice which would tend to defeat the provisions of the Act and of this Code.

SEC. 13. To compensate salesmen in any manner other than upon a fixed salary and full-time basis. To pay or offer to pay directly or indirectly any commissions or other remunerations for the sale of cement except as provided herein.

SEC. 14. To divert or permit the diversion of shipments of cement, the effect of which will be to enable a purchaser or user to secure cement at variance from the Member of Industry's filed price terms for the point of final destination.

SEC. 15. The prepayment of transportation charges on shipments consigned to other than the Member of the Industry itself (except in the case of railroad freight charges to stations to which regulations require prepayment from any shipping point) or the payment of demurrage charges by any Member of the Industry on such shipments; provided, however, that the foregoing provision, except as to demurrage charges, shall not apply to shipments purchased directly by and consigned to departments of the United States or State Governments.

SEC. 16. Knowingly diverting or permitting to be diverted to other uses, cement shipped for a specific work project or knowingly shipping on a specific sales order or contract an amount of cement in excess of the actual needs of such work.

SEC. 17. To entice the employees of a competitor with the intent or effect of interfering with the conduct of the business of such competitor; provided that nothing herein shall be construed to prevent any employee from voluntarily changing his employment in order to better his condition.

SEC. 18. Knowingly to ship cement by any transportation agency which makes payments or concessions by rebates or otherwise for the purpose or with the effect of inducing or influencing the sale or purchase of cement.

SEC. 19. The payment, or offer to make payment, directly or indirectly, of any advertising expenses of purchasers or users of cement.

SEC. 20. Lavish, excessive or undignified entertainment of purchasers or users of cement, or others connected therewith; donating funds, or providing banquets or other similar lavish entertainment for purchasers or users, or associations thereof; giving or offering to give premiums, personal gifts, gifts of cement, or gifts of any other commodity of value to purchasers or users of cement.

SEC. 21. Selling or offering to sell a non-Industry product together with an Industry product when the combined price for the two products is less than the applicable filed price for the Industry product, plus invoice cost (including transportation costs) for the non-Industry product, or the filed price for this non-Industry product by a Member of this Industry who is also a Member of the Industry of which this non-Industry product is an Industry product, for the purpose or having the effect of influencing or inducing the sale of products of the Industry and thereby creating an unfair price advantage for a Member of the Industry.

SEC. 22. The furnishing of articles or facilities of a definite physical nature, whether by way of loan, lease, gift, or otherwise, without commensurate consideration therefor. (Services to purchasers or users are proper under fair competition, if confined within the limits of advice and consultation.)

SEC. 23. Maliciously refusing to sell to, or maliciously interfering with the business of, dealers or users of products of the Industry purchased from a competitor, for the purpose of interfering with the conduct of the business of such competitor.

SEC. 24. Filing or agreeing to file new price terms or making or agreeing to make

any new or special price, or prices, or terms, on Industry or other products, as a condition or in consideration of the receipt or placement of an order for any product of the Industry.

SEC. 25. Using any subterfuge, either in collusion with an affiliate or otherwise, for the purpose or with the effect of evading or violating the provisions of the Act or of this Code; or engaging in a transaction involving, or being a party to a sale influenced by any act performed by an affiliate or otherwise, which act if performed by such Member of the Industry would be in violation of this Code.

SEC. 26. The direct or indirect giving, permitting to be given, or offering of money or anything of value by a Member of Industry, or his agents, employees, salesmen, or representatives, to the agents, employees, buyers or representatives of customers or prospective customers, or to the customers themselves, for the purpose of inducing such customers, or their agents, employees, buyers or representatives, to purchase or contract to purchase products from the Member of In-

dustry making such gift, or suffering the same to be made, or to refrain from dealing or contracting to deal with competing Members of Industry.

SEC. 27. The following practices, undertaken for the purpose or with the effect, directly or indirectly, of furthering the sale or use of a particular brand of cement shall constitute unfair trade practices and a violation of this Code:

(a) Except with the approval of the N. I. R. Board (which, when given, shall apply to all Members of the Industry in the marketing area affected) the purchase by any Member of the Industry of bonds or other securities, issued for the financing of construction work, either in the name of the Member of the Industry, its subsidiaries, or of individuals, or officers connected therewith, or the acceptance of such bonds, or other securities, in payment, wholly or in part, for cement, or the advance, loan, or payment of any moneys by a Member of the Industry for the purpose of inducing the purchase of cement, or to assume cost of bidders' bonds or to endorse or guarantee or in any way

relieve a bidder of the responsibility for or the expense of providing such bonds.

(b) For a Member of Industry to maintain or utilize any business relationship with any purchaser or user of the products of this Industry, whether or not such purchaser or user is an affiliate, a member of another Industry, or any individual, partnership, corporation, association or other form of enterprise for the purpose or with the effect of violating any provisions of the Act or of this Code.

(c) For the purpose or with the effect of evading the provisions of this Code, the purchase of fuel or supplies, either directly or indirectly, or in the name of the company, or its subsidiaries, or of individuals, or officers connected therewith, at prices above the market price thereof at the time of purchase.

Method of Selling

The new code does not attempt to settle the dealer discount problem, as did the old one. The different marketing areas are left free to form their own rules in this regard.

Controlling Electric Drives

By J. M. Pomeroy,

Chief Electrician, Lawrence Portland Cement Co., Thomaston, Maine

WHEN a line of machines is to be stalled, a study should be made to determine what kind of control would give the best service at the lowest cost. On a first cost basis, simple hand control with the controllers placed to obtain the greatest economy in wiring would probably be chosen, but maintenance on such an installation tends to be high because of the entrance of the human element. The following of such economies would probably place the controllers in positions from which the operator could not see the machines start; one of the most common violations of "Underwriter's Rules." The chief argument against this practice is that a machine when starting may be damaged by the development of a fault that can't be seen; or a workman working out of sight of the operator may be injured. Then again hand control does not lend itself readily to the predetermination of time and current values, which is necessary if control and machine maintenance are to be kept at a minimum.

On the other hand, automatic or remote control is higher in first cost, but by its use controllers can be grouped in a clean, convenient location and the main lines of the wiring can be kept short. The control buttons can be grouped at a point from which all machines can be seen by the operator. And in addition, time and current values can be predetermined to secure smooth starting, and in case of trouble, starters can trip free without depending on the will of the operator.

When machines are complementary, that is, where one machine is dependent upon the operation of another, they should be interlocked through relays so that the develop-

ment of trouble on one will not be transmitted to another. A simple example would be a rock crusher and the elevator or conveyor that removes the crushed stone. They should be hooked up so that the conveying machine would have to be started first, and in the event that it became stalled the crusher would stop immediately. This would prevent possible damage to the machines and prevent the crusher from becoming plugged underneath. When a crusher stops while full of rock it quite frequently cannot be started until the rock is removed, but as a rule, it is less expensive to remove the rock from the crusher than to dig out a flooded elevator or conveyor.

Kiln Feeding Drives

We have arranged a system of this type on the equipment that feeds our cement kilns. This being a wet process plant, the slurry, or raw material from which cement is made, is pumped from a blending basin, through a Ferris wheel metering device to a disc filter that dewateres the slurry and discharges cake over a belt conveyor, through a pug mill and a water-jacketed screw into the feed end of the kiln. The Ferris wheel feeder is driven from the kiln drive; its speed therefore is proportional to the speed of the kiln. The slurry flows from the Ferris wheel by gravity to the filter tank, which has an overflow back to the blending basin.

As the flow into the filter is variable, the filter is driven by a variable-speed, d-c. motor, and the speed is varied to maintain the level in the filter tank between limits. When first installed the speed was controlled by a hand-operated rheostat, but it was found that the attendant was unable to control the

level sufficiently close to prevent occasional overflow. It might be well to state here that the attendant had other duties that occupied a large part of his time, and it was this fact rather than frequent changes in kiln speed that caused the instability. As the overflow from the filter tank returned to the blending basin and was again pumped through the metering equipment, it can be seen that the readings from the meter would be false. To overcome this it was decided to operate the filters by float control.

Float Control Device for Slurry Feed

A float to work well had to be of light construction in order to respond quickly, and designed in such a way that it would not accumulate a load of dried slurry. Fig. 1 shows the design used, and it has operated for four years without trouble. The top of the float is connected by means of a light hollow rod to a sliding carbon contact on a rheostat plate. The distance between the top and bottom segments of the plate is the distance that the slurry in the tank is allowed to rise and fall.

When the change to float control was made, the hand rheostat of the motor control was retained and divided into the required steps; from these points leads were run to the segments of the float operated plate. By referring to Fig. 2 one can trace the connections and see that as the float rises, and moves the sliding contact upward, resistance is inserted in the motor field, thus causing the motor speed to increase.

Kiln Feed Control

The supply of slurry cake discharged from the filters to the belt conveyor is irregular

and often in the form of large chunks that would at times plug the screw feeding the kiln. In order to make this feed even, a pug mill was installed between the belt conveyor and the feed screw. The three latter machines, belt conveyor, pug mill and feed screw, are driven by squirrel-cage motors which are controlled by across-the-line remote controlled starters. These starters are interlocked through relays so that their motors can only be started in the following sequence: feed screw, pug mill and belt conveyor. The belt conveyor is also interlocked through the kiln control and the control of the filters through that of the belt conveyor. Should any machine in the line become plugged or otherwise caused to stop all the machines feeding it will stop also. Should the kiln be stopped the filters and belt conveyor will stop, but the pug mill and feed screw will continue to run and discharge the material in them to the kiln. This is necessary, for should the kiln be down for any length of time, the material in these machines will dry out and become hard, requiring that they be cleaned out before starting. The sequence of operation and the wiring connections can be seen by referring to Fig. 2.

The feed screw is supplied with a start-and-stop button and can be started and stopped at any time. The pug mill and belt conveyor have start, stop and jog buttons by means of which they can be stopped when desired, started after the preceding machine or operated momentarily with the jog button when it is desired to spot them for repairs.

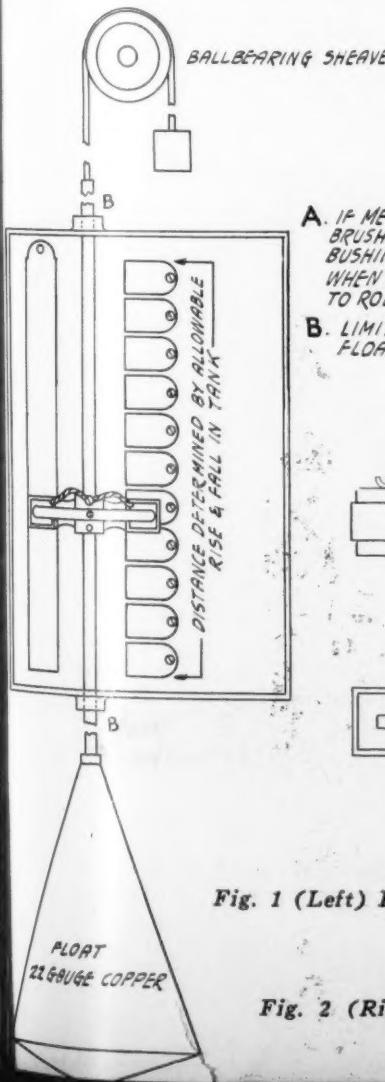


Fig. 1 (Left) Float control for slurry feed

Fig. 2 (Right) Wiring diagram

The filters can be operated independently of the conveying equipment by closing a hand-operated switch that shunts the relays in the d.c. circuit.

Filter Control

In the filters the water is removed from the slurry by a vacuum pump through cloth bags stretched over channelled wooden frames. The wooden frames are segments of a wheel or disc that rotates with the lower half dipping in the slurry in the tank. The suction of the pump draws the slurry against the cloth surface, the water passing through and the ground limestone forming a cake which is peeled off the surface and discharged to the belt conveyor. There are seven discs in the filter mounted on a common shaft, and ten segments in each disc. In order to obtain the required filter surface two filters or sets of discs were installed on each kiln, but only the control for one is shown in the drawing.

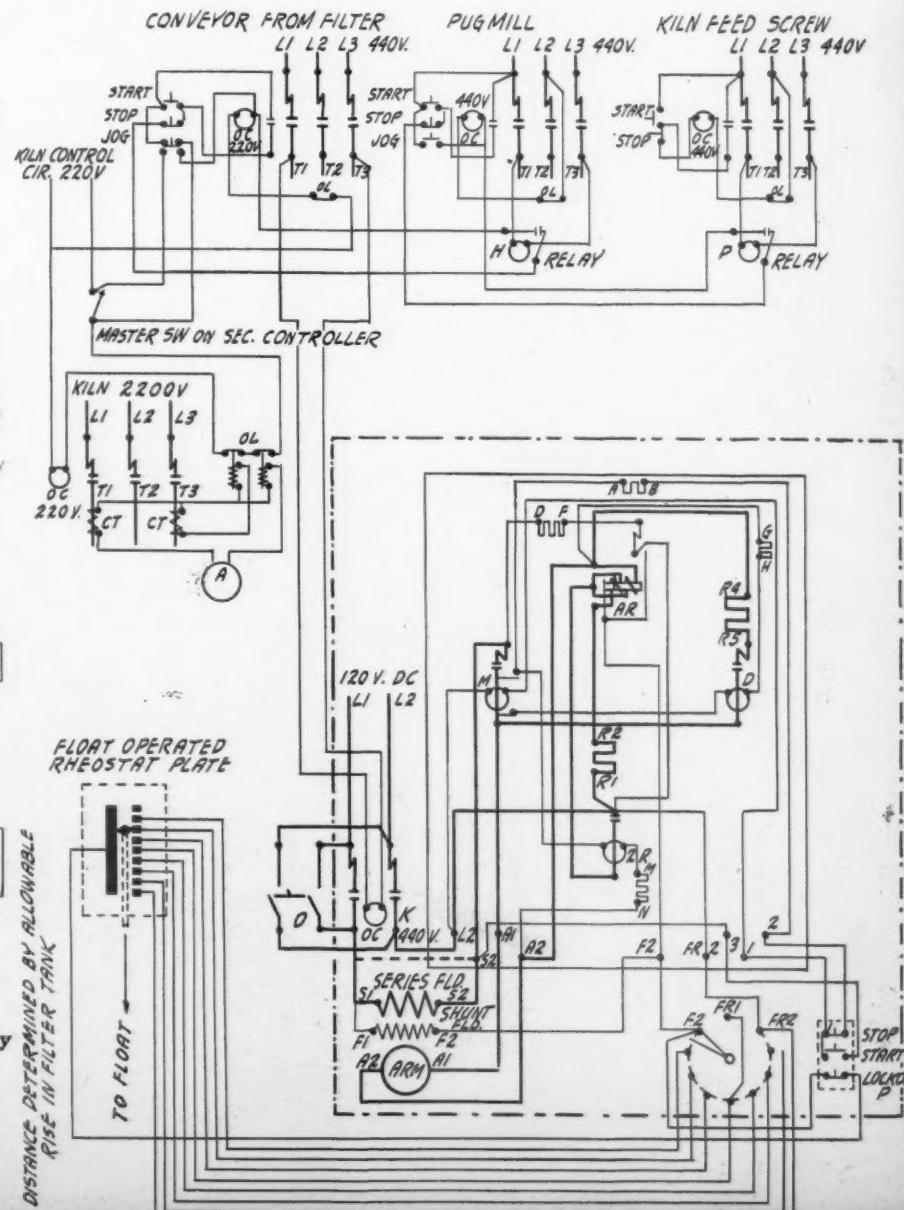
With the above electrical hookup the filters cannot be run unless the belt conveyor is running, except when the hand-operated switches which shunt the relays in the d.c. circuit are purposely closed. Normally the two filters are operated together at low speed, and when on float control, one can be shut down to replace worn or damaged bags and the other will automatically speed up to handle the load. Either filter can be operated on

hand control by operating the lockout switch *P* and closing switch *O*. In order to facilitate spotting the filters for repairs, the d.c. controller is equipped with a dynamic braking feature to prevent over-travel.

All of the parts used in this installation are standard equipment. The push buttons and relays are carried in stock by several electrical manufacturers and are inexpensive. The controllers on the variable speed motors are Counter E.M.F. Machine Tool Controllers, and those on the squirrel cage motors are Across-the-line Magnetic Starters.

Controls of this nature assure maximum production; and shut-downs, when they occur, are held to a minimum of time by eliminating the piling up of material in stalled machines. In addition, every operation of the controls is performed as it should be, with proper timing and minimum wear on contacts, thus keeping maintenance low. From the attendant's point of view the operation is reduced to the pushing of a button.

By making a study of existing conditions, standard equipment can be selected and arranged to meet manufacturing requirements. At a small additional cost transformers can be inserted in ungrounded systems to insulate control from power circuits. By this means control voltages can be held to lighting circuit potentials, and by proper grounding a maximum of safety is assured.



Glory-Hole Quarry of Santa Cruz Portland Cement Company

By Edmund Shaw,
Contributing Editor, Rock Products

THE Santa Cruz Portland Cement Co. operates one of the largest plants in the world, and it quarries approximately 3000 tons of limestone daily from its glory-hole quarry in Davenport, Calif. The glory-hole method has been used many years in the mining industry, and its reputation in that industry was that it produced ore cheaply but was dangerous; and that accidents, some of them fatal, were to be expected. In fact, it is said that the name of glory hole was given this kind of quarry because so many men "went to glory" in it.

But study and attention to details, careful training of the men, and the willingness to spend money for extra raises and tunnels, put in wholly for safety, have made the glory hole of the Santa Cruz company one of the safest anywhere to work in. The record proves this. Since 1926 there has not been a serious accident in the quarry and there were no serious accidents before that except one or two that came to men who had left their own work and gone to where they had no business to be. The quarry of the Santa Cruz company has a remarkable safety

record, anyway, because for the past five years there has not been even one lost time accident.

Glory-hole quarries and mines are not common, and it may be that the reader does not know what one is like. If so, it will help him to look at the sketch of a section through one of the raises, which Mr. Davis, the quarry superintendent, drew in the writer's notebook, and which is almost self-explanatory.

Safe Glory-Hole Mining Explained

To start "glory-holing" you run a haulage tunnel—or two of them, in this case—as far under the deposit as you can get conveniently. Then at intervals you put up raises, which are cheaper than shafts, until you break through to the surface. At the bottom of each raise you cut out a bin and put in chutes and gates so that you can load cars on the haulage tunnel tracks. Being in the deposit, all the rock you take out in this development is of the same kind you will quarry, and this helps to keep down the expense. It is the simplest and probably the

cheapest of all methods, simpler even than an open pit because nothing has to be hoisted.

In the sketch (No. 1), *a* and *a* are the haulage tunnels, 12 ft. wide and 9 ft. high. The chutes are marked *b* and *b*; and the gates, *g* and *g*, at the ends of the chutes, are operated by compressed air. The bin *c*, which holds the rock that comes down the raise, is called the bulldozing chamber because rocks that are too large to go to the cars are drilled and blasted there. Blockholing above keeps this down as much as possible, but some large pieces are bound to go down the raise. The raise is marked *d*, and *e* is the glory hole proper, the hole made by drilling and shooting the rock so that it will roll down into the raise.

Attention is called especially to the two tunnels, *f* and *f*, outside the bulldozing chamber, for they are an essential feature of this safe method. They run on both sides of the bulldozing chambers and are connected to them by short tunnels, and this gives access to the bulldozing chambers without ever getting under the raise. It was by getting under the raise that lives were lost sometimes in





Entrance to glory-hole mine of the Santa Cruz Portland Cement Co.

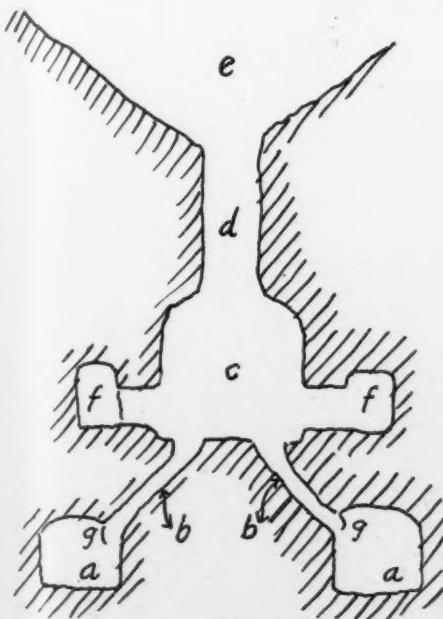


Fig. 1—Haulage tunnels and chutes

the old glory-hole mines. It was not uncommon to have the ore hang up (by wedging) in the raise, and then someone had to

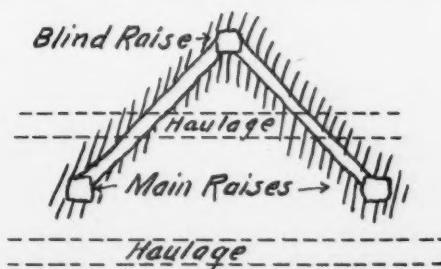


Fig. 2—Showing location of a blind raise—a safety measure

go up under it and put in a shot that would start it down. Today no one would be permitted to go under such hanging rock for any reason.

Another safety working is shown in the little plan (No. 2). The two haulage tunnels and two raises are indicated and at one side is a blind raise, one that is not carried through to the surface. This is connected with the raises by two drifts, or tunnels; in fact there are several of these drifts because the arrangement shown is repeated at every level, or rather these make levels. Through these workings men can get out to the rock

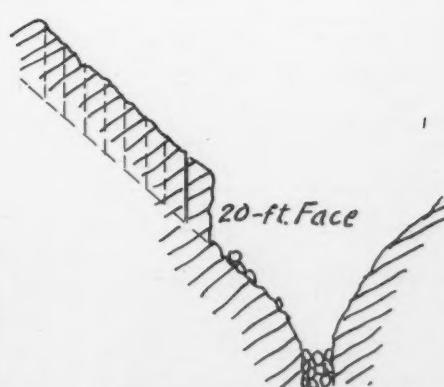


Fig. 3—Method of drilling and blasting

where it is wedged, or near enough to the jam to start it with a shot or by barring down the key pieces. In either case the man who does the work is out of the way when the rock comes down, and if he has to shoot he can be down in the haulage tunnel before the shot goes off.

Of course, these raises and tunnels put in for the sake of safety cost money, but the money is well spent if it is considered as an investment alone. Men work so much better

when they feel safe and when they know that the company is willing to do anything in reason to keep them feeling that way, and in this kind of a job morale is the first essential.

Drilling and Blasting

The method of drilling and blasting is shown in the third sketch. Vertical holes are put down 20 ft. deep and 10 ft. back of the face, and spaced 9 ft. to 10 ft. Perhaps 2 or 3 dozen may be drilled in one part of the quarry while more or less the same number are being drilled at other places. There is no continuous face carried, although, of course, the work proceeds by an orderly system which has been worked out in advance. All shots are fired by electricity. Much of the rock that is broken rolls down the slope of the glory hole at once. The remainder has to be started down by barring. The dotted lines in the sketch show the position of future shots and the slope that will be left after they have been fired.

The work of drilling and barring down the rock that is broken looks dangerous but it is not really so to a trained man. He works with a safety rope around his waist, which has been found better than a belt

because it is not so hot in summer. And the men are placed so that one cannot endanger another by starting loose rock to roll down. However, the great safety factor is that of training the men. In the first place, they are picked men. Almost all of them have at least a high-school education, and they must be sober and intelligent to get a job in this quarry. It has been found that the well-meaning stupid man is dangerous, because he forgets or else he merely neglects to do what he has been trained to do.

Ingersoll-Rand drills are used in all the drilling, block holing as well as primary blasting. Tests were being made with the standard, double-taper cross bits when these notes were taken, but the Timken detachable bits were being regularly used. Mr. Davis said that it pays to use them even though they use up by breakage a lot of drill steel. It was interesting to learn from him that the best American steels give much longer service than the best of the Swedish steels, Bethlehem 0.75 carbon giving the best service of all.

The compressor is a Type 10, 350-cu. ft. Ingersoll-Rand machine. The pressure is 98 lb., which means 95 lb. at the drills. The long 6-in. pipe that passes through the tun-

nels and around through the quarry acts as a receiver. Compressed air is used to operate the gates as well as for drilling.

The holes are sprung with about ten sticks of 1x8-in. 60% ammonia powder and then loaded with about 25 lb. of free-blowing powder. Drillings are used for tamping. All shots are fired by electricity, including block holes, and the only exception to this rule is where an isolated boulder, some distance from the work, has to be broken. Mud cap shots are never used.

Transportation

Transportation of the rock to the plant is by electric trains drawn by powerful electric locomotives. These are run by storage batteries in the haulage tunnels, and by current from a trolley wire on the outside. The cars, which are almost cubical and hold about 13 tons, are loaded rapidly. The first car is spotted and the man at the gate opens the air valve which controls the gate. As soon as the car is full a whistle sounds and the engineer pulls ahead for the next car, and so on. The whistle blasts follow one another so quickly that it is hard to realize that a car has been loaded in so short a time. Most of the gates are the swinging arc type.



Santa Cruz quarry looking across glory-hole



Faces 20 ft. high are carried on slope



Blasting shelters in glory-hole



"Safety-first" always in evidence

It is about three miles from the quarry to the mill and most of the way the road skirts a mountain and is some 400 or 500 ft. above the canyon. There is enough down grade so that the cars run by gravity practically all the way in, and power is used only in pulling back the empties. Locomotives and cars were made for an Alaska gold mine which went out of business. They were designed to be used in a similar operation and they seem to be about as well adapted for it as anything could be.

Nature of Deposit

The deposit worked is a sort of limestone island included in a batholith of grano-diorite. The grano-diorite runs along for miles, forming the backbone of the Santa Cruz mountains. Heat and pressure have metamorphosed the limestone into a semi-marble. The calcium carbonate content varies from 85% to 92%, the remainder being clay or clay forming minerals, and there is a small percentage of magnesia. There are no fossils from which the age of the deposit may be determined, and in this and in some other features it resembles the famous deposits at Rockland and Camden, Maine, on the Atlantic coast.

Originally the deposit was worked as a hand-loading quarry and the rock was lowered to a crusher in cars which were pulled back by a hoist. The foundation for the No. 18 crusher may be seen, sticking up like a column in front of the haulage tunnels, in the photographs. Then a cableway with skips was tried but this did not last very long, and then steam shovels were used. One of these is still used for stripping but the other lies in pieces where it was caught by a slide, in which, fortunately no one was injured. After the slide it was decided to use the present system, which was installed in 1923. It was laid out by R. A. Kinzie, mining engineer, who had charge of the same kind of workings in the Alaska-Treadwell mines. The Treadwell glory hole had a

great reputation for safety, and there was only one accident in it while Mr. Kinzie was there, and that had nothing to do with the work.

The deposit is unusually well adapted to the method, owing to its great depth. There is about 500 ft. of limestone above the haulage tunnels and there is a lot of it that can be developed by putting in branches to the haulage tunnels and the necessary raises. And the climate, too, is right for this method, which is not so easy on the men where there is much ice and snow. Where conditions are right for it, this method should always be considered on account of low costs for development as well as working. Development costs are almost unbelievably low where the deposit is of sufficient size and depth.

Cement

Companhia Nacional de Cemento Portland, Rio de Janeiro, Brazil, subsidiary of the International Cement Corp., New York City, recently installed a Cottrell electrical precipitator for dust elimination. The installation was made by the Western Precipitation Co., Los Angeles, Calif.

◆ ◆ ◆

Portland Cement Association, Chicago, Ill., has issued a fine piece of promotional literature—"Beauty in Walls of Architectural Concrete"—which should prove helpful to all interested in developing a greater use of concrete.

◆ ◆ ◆

Lehigh Portland Cement Co., Iola, Kan., plant has installed four 20-in. Schaffer piodometers to proportion clinker and gypsum fed to Hercules mills. The piodometers are driven by variable-speed d.c. motors.

◆ ◆ ◆

Wabash Portland Cement Co., Stroh, Ind., plant has begun operation after a

long period of inactivity. This is one of the few plants left which uses marl as a raw material. Clay is brought in by truck from Steubenville. The plant was built about 35 years ago. It has been closed for three years, with the exception of a short run in the summer of 1934. Gene Hall is superintendent.

◆ ◆ ◆

Cowell Portland Cement Co., Cowell, Calif., unless it is able to have set aside a recent order of the superior court judge at Santa Rosa, will be prohibited from operating its plant between May 15 and November 15, unless it installs dust collecting equipment to recover 85% of the dust escaping from its stacks. The order was obtained by agriculturists in the vicinity following years of litigation. The judge held that the stacks were discharging 15 tons of material daily, each, to the detriment of crops on adjoining lands.

◆ ◆ ◆

Lehigh Portland Cement Co., Iola, Kan., plant, is really not in Iola but in Bassett, a municipality of 200 inhabitants. C. A. Swiggett, general superintendent of the cement company, is the mayor. During the recent depression years, the company, individual citizens, and the city have coöperated to beautify the streets and houses, through landscaping, planting flowers and trees.

◆ ◆ ◆

Lone Star Cement Co., Alabama, Birmingham (subsidiary of the International Cement Corp., New York City), is installing two B. & W. No. 138 coal mills for direct firing of two of its 280-ft. kilns. The third kiln is already equipped with a Raymond 4-roller mill.

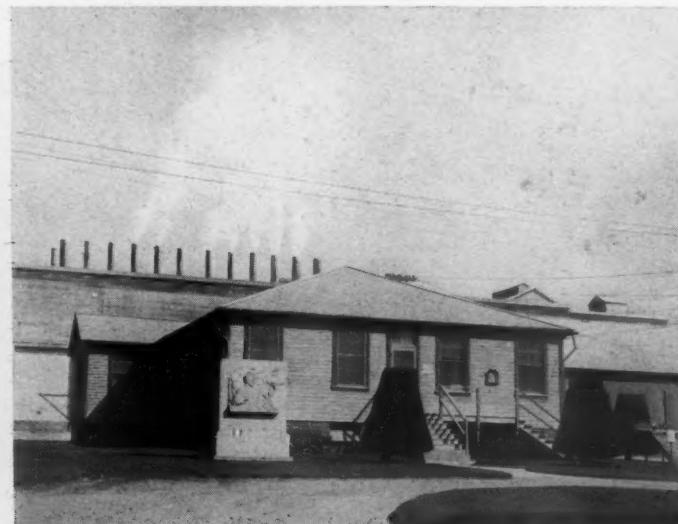
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Talc

Southern Talc Co., Chatsworth, Ga., is being organized to produce pulverized talc.



Device used to promote competition in safety-first contest—
images represent each department



Safety-first efforts rewarded by P.C.A. trophy—Plant office of
Santa Cruz Portland Cement Co.



View of the White Rock plant of the Kelley Island Lime and Transport Co. from the quarry

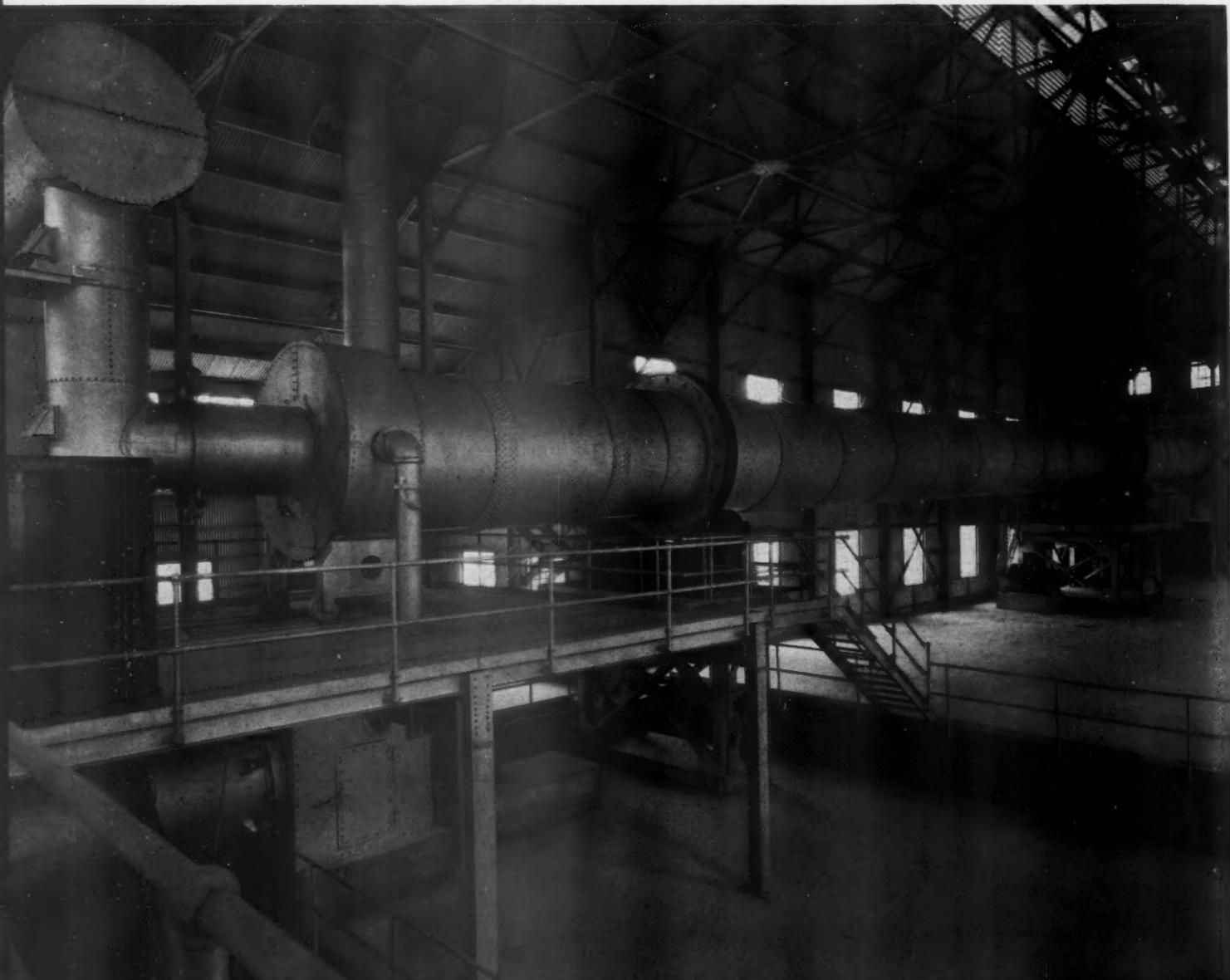
Hard-Burned Dolomite Plant of Kelley Island Lime and Transport Company

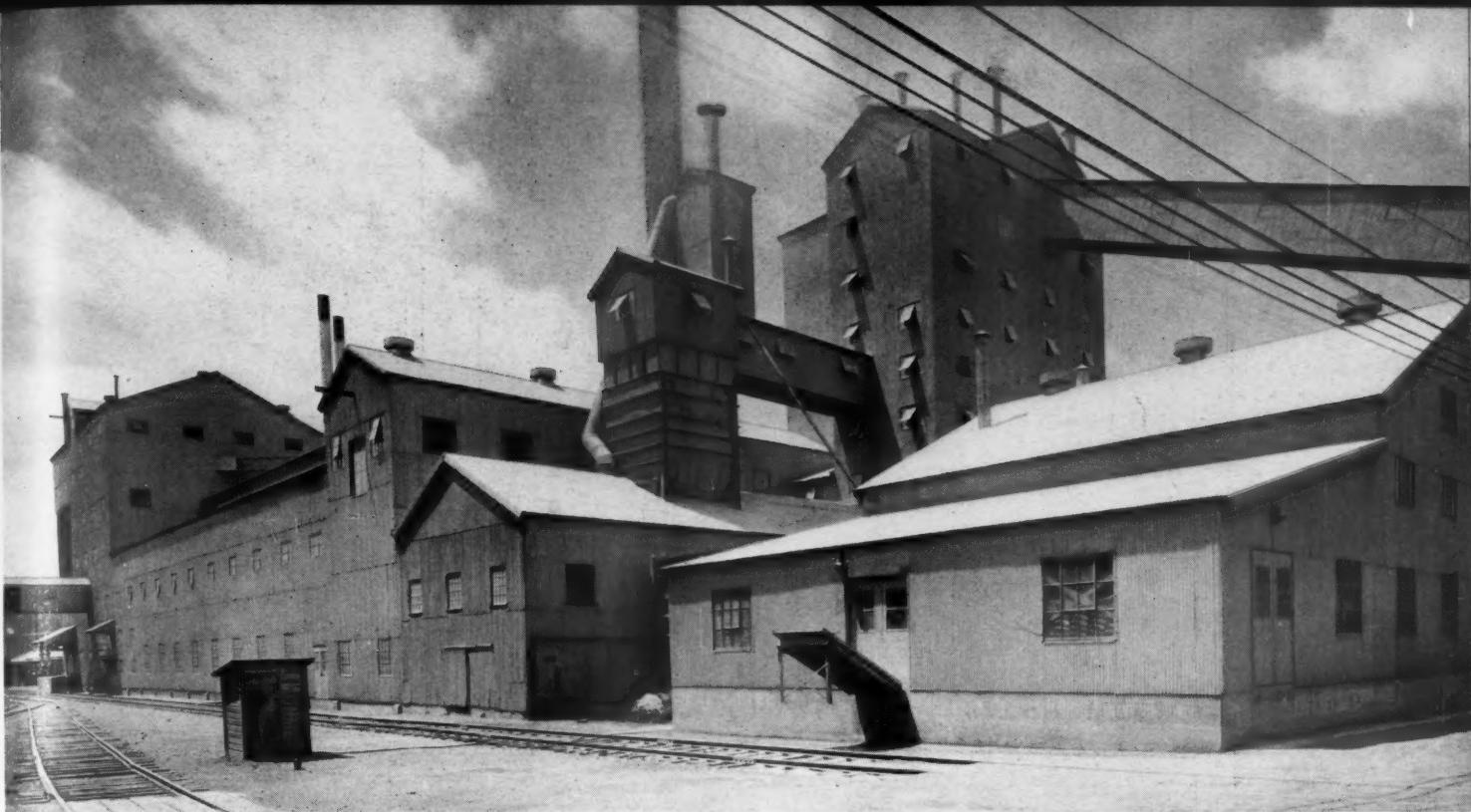
THE Kelley Island Lime and Transport Co. is probably the largest producer of limestone products in this country. These products include lump lime, high calcium, high magnesium or intermediate grades, in bulk or barrels; pebble lime, high calcium, in bulk, barrels or sacks; ground lime, high calcium, high magnesium or intermediate

grades, in bulk, barrels or bags; hydrated lime, high calcium, high magnesium or intermediate grades, in paper or cloth bags, or barrels; finishing hydrated lime—the "Tiger" brand; masons' hydrated lime; chemical hydrated lime; agricultural hydrated lime; all purpose lime—household size package; spray lime, high calcium or high magnesium; dairy

magnesium lime; refractory burned dolomite; limestone, various analyses from dolomite (high magnesium) to high calcium; fluxing stone for open hearth, blast furnace and foundry use; crushed stone for all industrial and construction purposes; ground and pulverized limestone for industrial, chemical and agricultural purposes; agri-

Rotary kiln as originally rebuilt to burn dolomite refractory, using producer gas for fuel



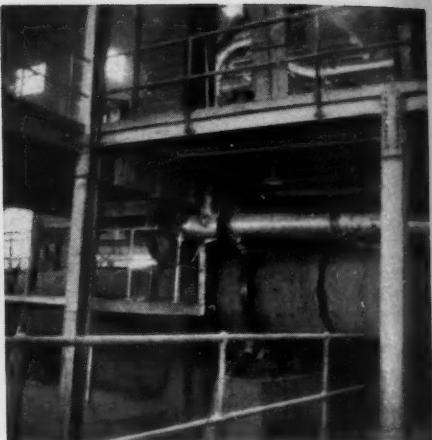
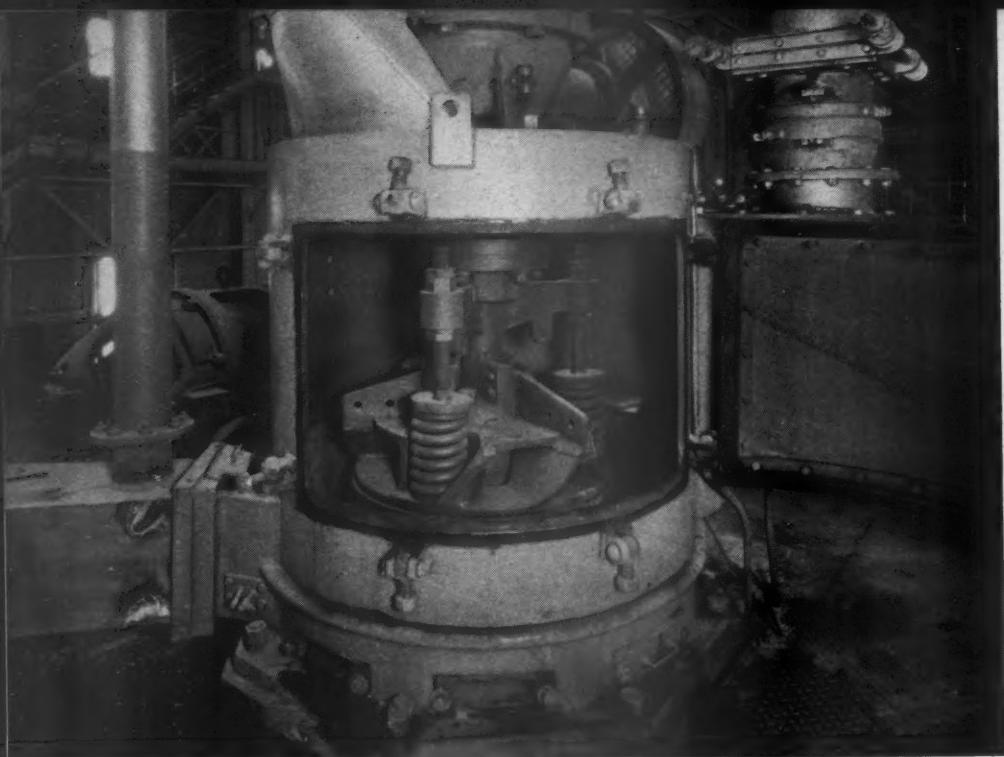


Above: General view of rebuilt plant at White Rock: Kiln building at the left

Right: Bucket conveyor discharging finished product to bins

Below: Discharge (finished product) end of kiln room, showing finished product bins (upper left) and cooler discharge (lower right). At the left is the housing of the pivoted-bucket carrier and elevator





cultural screenings; mine dust; raw dolomite; asphalt dust; pier and rip-rap stone.

The company made a hard-burned dolomite refractory material for the steel industry during the war, but following the war the tremendous upturn in building, and the consequent demand for finishing lime, led



Above: Cooler, with intake fan and pipe from kiln hood to coal pulverizer

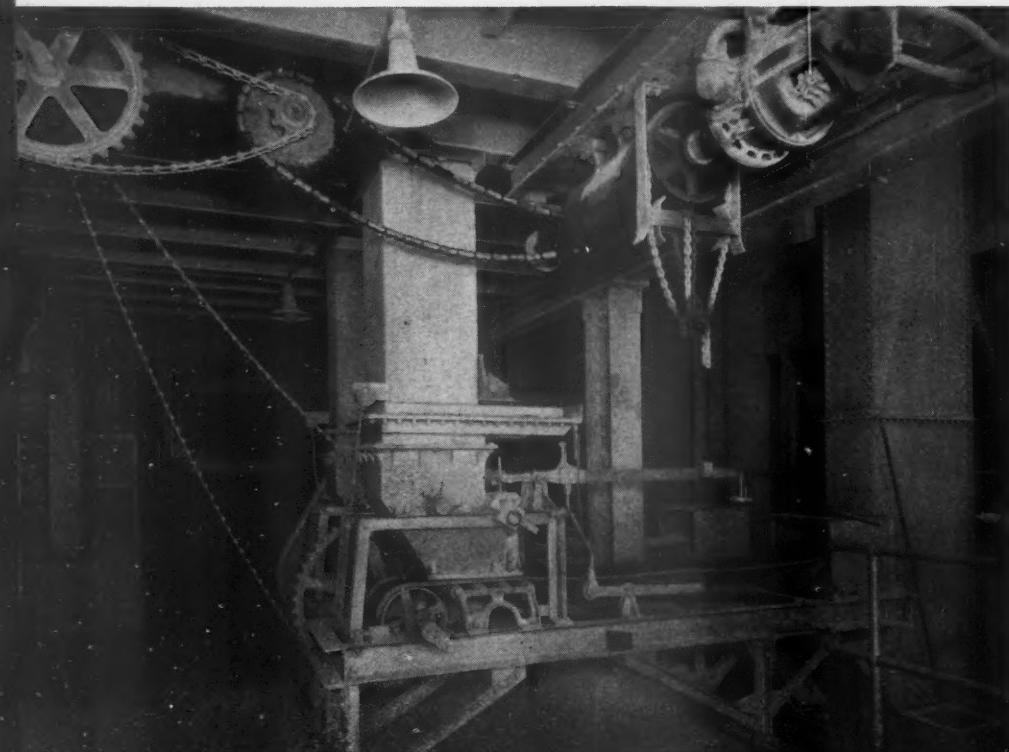
Above (left): Interior view of the coal pulverizer, with door swing open

Left: Finished product bins

Below (left): Poidometers for proportioning the raw materials (stone and mill scale). Note the speed reduction necessary on mill scale (foreground machine)

Below: Kiln drive

the company to return the rotary kiln at the White Rock (Clay Center) plant to the manufacture of finishing lime. The depression of the last five years changed the picture again, and the White Rock plant again began to manufacture dolomite refractory, using a special process in which steel rolling-mill scale is burned with the dolomite, so that the refractory is actually impregnated with iron. It is in the form of accurately sized granules.

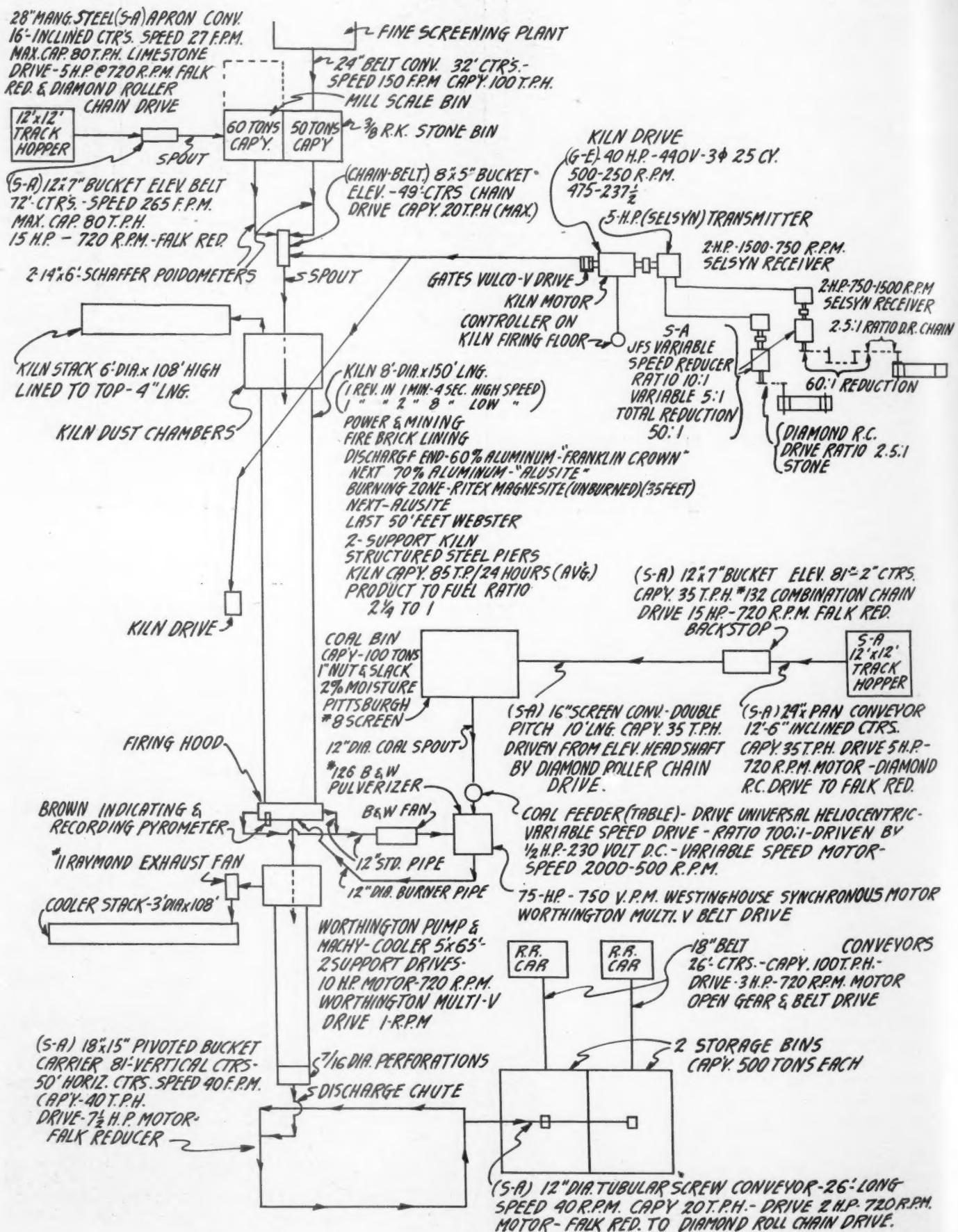




Kiln room showing kiln motor on the floor away from heat of the kiln. Note the steel pier supports for the kiln. Space Is provided for a second and larger kiln

Close-up of the firing end of the kiln as it looks now with dire ct-fired coal pulverizer unit; the gas producer shows in the background, as it has not been removed; it will stay to be used to burn finishing lime, when demand may call for it

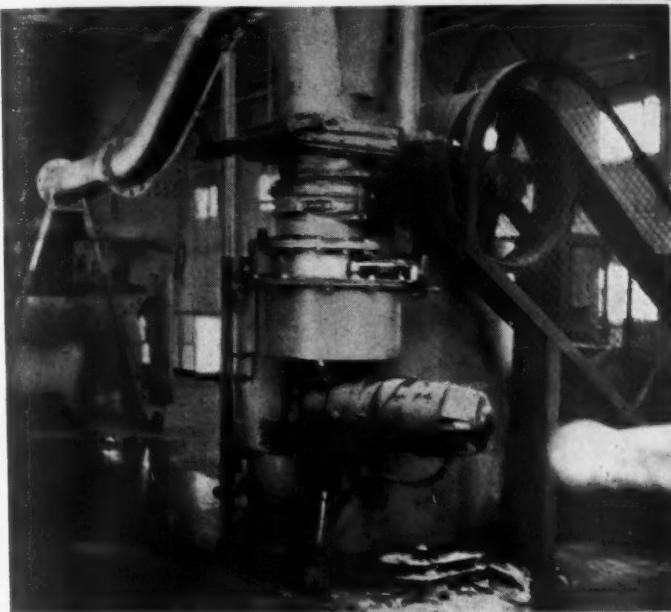




Flow sheet of the dolomite refractory plant of the Kelley Island Lime and Transport Co., White Rock, Ohio, showing descriptions of the principal pieces of equipment

The White Rock plant has been entirely rebuilt since 1930 to make many of the special products listed in the first paragraph. The description of the crushing and screening plant was published in *ROCK PRODUCTS*, December 19, 1931. Some of the material accurately sized below $\frac{1}{4}$ -in. is proportioned with the correct amount of rolling-mill scale and fed to the kiln. It is not necessary to go through a long description here, because the accompanying views, with the flow sheet, tell the whole story.

The interesting part of the story that the pictures do not tell is that this plant was almost if not entirely the "original" Ohio finishing lime plant—the former Toledo White Lime Co. With the slump in building construction following 1929, the Kelley Island company sought other uses and other markets for this dolomite. While most pro-

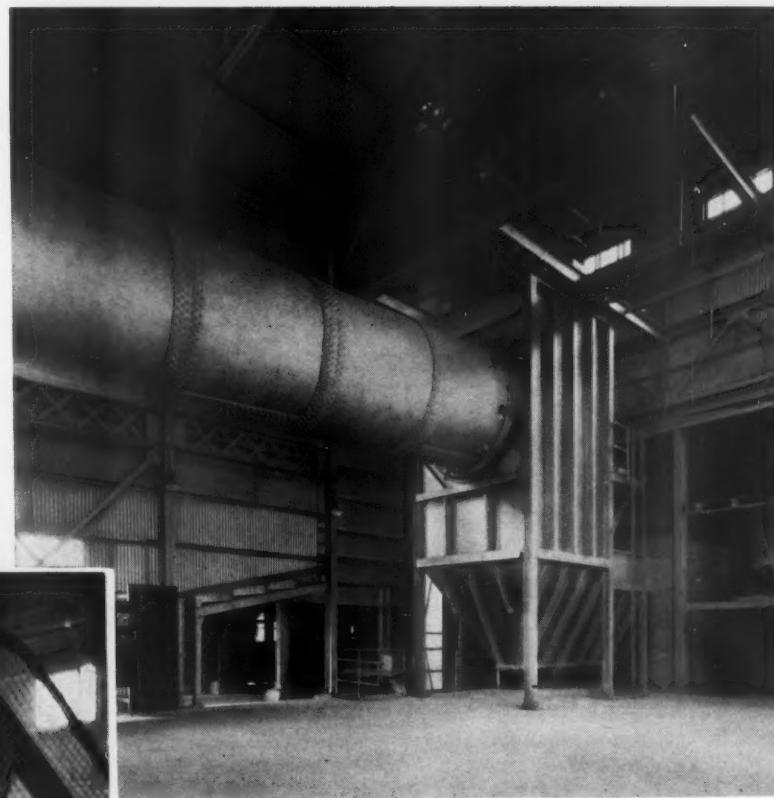


ducers waited a "return" of business, this company sought to create some, and with a firm belief in the future, and a comprehension that the plant as it then existed was hardly an asset, George J. Whelan, president and general manager, invested several hundred thousand dollars, when dollars would buy most, in this plant.

The gas producer originally used to burn lime, did not generate sufficient fuel to burn the dolomite refractory efficiently, and a Babcock & Wilcox Type B pulverizer for direct firing of the kiln was installed about a year ago—the first installation for this particular purpose, although cement kilns with direct-fired pulverizers of this type were in use at that time.

The refractory plant was designed by W. J. Verner, Jr., engineer of the company. J. E. Brunner is superintendent and S. S. Brown, foreman of the kiln department.

The home offices are in the Leader building, Cleveland. George J. Whelan is president and general manager; A. B. Mack, vice-president and assistant general manager; R. J. Schumacher, chief engineer.

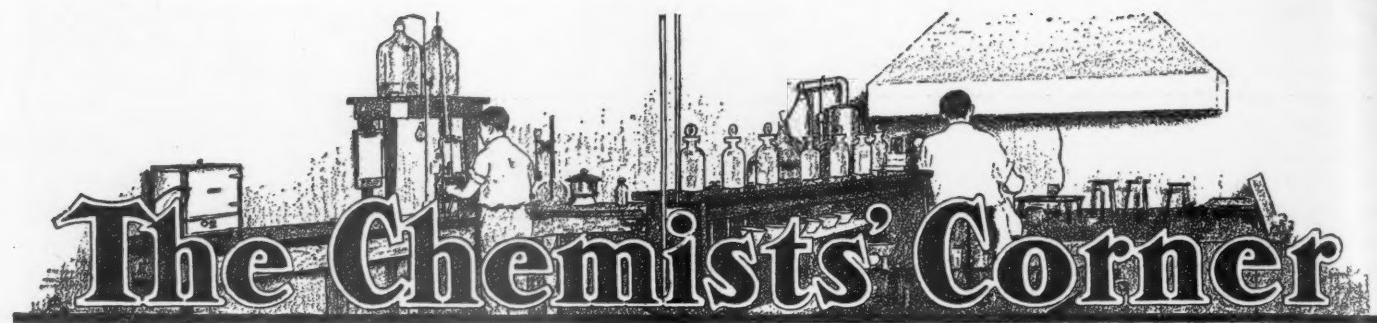


Above: Dust bin and kiln housing at feed end of kiln

Left: Coal feeder and drive on the coal mill



Finished product bins, showing (extreme left and right) almost the complete circuit of the pivoted-bucket conveyor-elevator



Purity Formulas for the Gypsum Chemist

By R. O. Klotz

Chemical Engineer, The American Gypsum Company, Port Clinton, Ohio

THE GYPSUM CHEMIST is often confronted with the question of purity of one form of gypsum when an analysis has been made on the material in another form. The following formulas have been worked out to facilitate a quick transition of the purity figure from one form to another.

Samples analyzed by the gypsum chemist are usually in one of the three following forms:

(1) *Gypsum*, in which one molecule of CaSO_4 is combined with two molecules of water.

(2) *Stucco*, in which one molecule of CaSO_4 is combined with one-half molecule of water (actually, of course, two molecules of CaSO_4 with one molecule of water).

(3) *Anhydrite*, in which the CaSO_4 contains no combined water.

Assuming that an analysis has been made on a sample of gypsum and that a calculation of the results of the analysis shows the gypsum to be 90.0% pure or to contain 90.0% by weight $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. By substituting this figure in Formula (1) below, it may quickly be determined that the gypsum, if calcined so that the $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ is converted to $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$, would produce stucco containing 88.4% of $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ by weight. Likewise, any other transition may be made by using the appropriate formula.

Formula (1)—Gypsum to stucco:

Let $x = \% \text{ CaSO}_4 \cdot 2\text{H}_2\text{O}$.

$$\text{Purity of stucco (\%)} = \frac{0.843x}{100 - 0.157x} \times 100.$$

Formula (2)—Gypsum to anhydrite:

Let $x = \% \text{ CaSO}_4 \cdot 2\text{H}_2\text{O}$.

$$\text{Purity of anhydrite (\%)} = \frac{0.791x}{100 - 0.209x} \times 100.$$

Formula (3)—Stucco to gypsum:

Let $x = \% \text{ CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$.

$$\text{Purity of gypsum (\%)} = \frac{1.186x}{100 + 0.186x} \times 100.$$

Formula (4)—Stucco to anhydrite:

Let $x = \% \text{ CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$.

$$\text{Purity of anhydrite (\%)} = \frac{0.938x}{100 - 0.062x} \times 100.$$

Formula (5)—Anhydrite to stucco:

Let $x = \% \text{ CaSO}_4$.

$$\text{Purity of stucco (\%)} = \frac{1.066x}{100 + 0.066x} \times 100.$$

Formula (6)—Anhydrite to gypsum:

Let $x = \% \text{ CaSO}_4$.

$$\text{Purity of gypsum (\%)} = \frac{1.265x}{100 + 0.265x} \times 100.$$

The derivation of Formula (1) is as follows:

Let $x = \% \text{ CaSO}_4 \cdot 2\text{H}_2\text{O}$ or parts by weight of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ in 100 parts of gypsum, as determined by analysis.

Then $\frac{27.024}{172.16}x$ = water loss in calcination of

the $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ to $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$. (27.024 is $\frac{1}{2}$ times the molecular weight of water and 172.16 is the molecular weight of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.)

Then $x - \frac{27.024}{172.16}x$ = parts of $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

which would be formed.

Also $100 - \frac{27.024}{172.16}x$ = parts of stucco (impurities included) which would be produced by the calcination.

Therefore the purity of the stucco, in percent, would be

$\text{Weight of } \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O} \times 100 =$

Weight of stucco

$$x - \frac{27.024}{172.16}x$$

$$\times 100$$

$$100 - \frac{27.024}{172.16}x$$

which may be condensed to

$$\frac{0.843x}{100 - 0.157x} \times 100$$

An analysis of a stucco sample sometimes shows that insufficient combined water is present to form the theoretical hemihydrate or $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$. In a recast of such an analysis, it is customary to compute the amount of $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ from the combined water determination and to consider the excess SO_3 to be present in the anhydrous form of CaSO_4 . After obtaining in this manner the

percentages of $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ and CaSO_4 in the sample, any natural anhydrite, which has the formula CaSO_4 but which is considered an impurity, may be determined by a microscopic count. Subtracting the natural anhydrite thus determined from the computed amount of CaSO_4 will give the percentage of soluble anhydrite in the sample.

Then, knowing the percentages of $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ and CaSO_4 (soluble anhydrite only), the purity of the gypsum from which the sample originated may be computed by using the following formula:

Formula (7)—Stucco containing soluble anhydrite to gypsum:

Let $x = \% \text{ CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$.

Let $y = \% \text{ CaSO}_4$ (soluble anhydrite only).

$\text{Purity of gypsum (\%)} =$

$$\frac{1.186x + 1.265y}{100 + 0.186x + 0.265y} \times 100.$$

The above formula is derived as follows: Let $x = \% \text{ CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ or parts by weight of $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ in 100 parts of the sample, as determined by analysis.

Let $y = \% \text{ CaSO}_4$ (soluble anhydrite only) or parts by weight of CaSO_4 in 100 parts of the sample, as determined by analysis.

Then $\frac{27.024}{145.14}x$ = water necessary for the

hydration of the $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ to $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.

36.032

And $\frac{36.032}{136.13}y$ = water necessary for the hydration of the CaSO_4 to $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.

Then

$$\left(x + \frac{27.024}{145.14}x \right) + \left(y + \frac{36.032}{136.13}y \right) = \text{parts of } \text{CaSO}_4 \cdot 2\text{H}_2\text{O} \text{ which would be formed.}$$

And

$$100 + \left(\frac{27.024}{145.14}x \right) + \left(\frac{36.032}{136.13}y \right) = \text{parts of gypsum (impurities included), which would be formed.}$$

Therefore, the purity of the gypsum, in percent, would be:

$$\frac{\text{Weight of } \text{CaSO}_4 \cdot 2\text{H}_2\text{O}}{\text{Weight of gypsum}} \times 100 =$$

Rock Products

$$\frac{\left(x + \frac{27.024}{145.14} x \right) + \left(y + \frac{36.032}{136.13} y \right)}{100 + \left(\frac{27.024}{145.14} x \right) + \left(\frac{36.032}{136.13} y \right)} \times 100$$

which may be condensed to

$$\frac{1.186x + 1.265y}{100 + 0.186x + 0.265y} \times 100$$

Bureau of Mines Activities to Be Expanded

AN APPROPRIATION of \$1,970,311 to the Bureau of Mines for the new fiscal year beginning July 1 is made in the Interior Department supply bill which has been signed by the President. This amount includes a net increase of approximately \$600,000, granted in response to numerous appeals from the mining industry urging that the Bureau be given sufficient funds to resume many important services that had been discontinued or curtailed because of cuts in appropriations during past years, and to undertake important new work that lack of funds had hitherto prevented.

The additional funds will permit an expansion of the economic and statistical studies of the Bureau. Investigations of health hazards in the mineral industries, which were suspended two years ago, will be resumed. This work includes studies of harmful dusts. Instruction in safety and first-aid, particularly at small-scale mining operations, can be extended. Such operations have attracted many inexperienced and unemployed men, and as a rule do not provide means of avoiding dangers that may result in accident or ill health. Training in first-aid is one of the most effective ways of education in safety.

Even the 200,000 analyses of coal made by the Bureau of Mines are inadequate to meet the demand, stimulated by the NRA codes, for data on comparative fuel values of delivered coal and for a suitable classification of the different American coals. Modern industry also needs to know how coal disintegrates on handling or storage, whether it cakes in the fuel bed, how easily it can be pulverized, whether it is suitable for making gas or coke, and what chemicals can be derived from it. A portion of the increased funds will be expended for research on these important problems.

The Bureau will expand its studies on low-temperature carbonization of coal in the effort to find a solution for the smokeless-fuel problem and thus prevent waste of fuel value in the soot and tar composing the smoke.

Among the new studies to be initiated will be electro-metallurgical research to develop possible uses for surplus power at Boulder Dam, Muscle Shoals, and other Federal proj-

ects, by the exploitation of adjacent mineral deposits and the production of aluminum, magnesium and other metals by electrolytic or electrothermic methods.

The Bureau will undertake a survey of the more important mining districts primarily to determine the resources and productive capacities, but incidentally, where needed, to assist small operators who cannot afford to employ competent engineers in the solution of their technical problems, and thus prevent economic waste resulting from ill-advised expenditures of time and money by inexperienced persons attempting small-scale mining operations.

Sand and Gravel Directors to Meet in Chicago

WHAT IS LIKELY to be a most important and crucial meeting of the board of directors of the National Sand and Gravel Association will be held at the Palmer House, Chicago, July 10 and 11. With the collapse of NRA, because of the Supreme Court decision of May 27, the responsibility for carrying on and saving whatever good came out of their code experience, devolves upon the national associations of the industries.

Also to be discussed will be the various phases of public works expenditures, upon which the industry is so dependent at this time. As usual, all members of the association, whether members of the board or not, are invited to attend the meetings, although of course decisions are made by the board members only.

Lime Industry's Convention

THE ANNUAL CONVENTION of the National Lime Association, as already announced in ROCK PRODUCTS, will be held at the Homestead hotel, Hot Springs, Va., June 19, 20, 21. Preceding the convention there will be a meeting of the Code Authority (may be ex-Code Authority at that time) on June 17 and a meeting of the association's board of directors on June 18. With the critical situation facing all industry as a result of the collapse of NRA, or its threatened collapse, as a result of the Supreme Court decision of May 27, the members of the lime industry should turn out in force. The code can be continued voluntarily with the backing of the industry itself.

Uses of Lime

Two important highlights of the association's annual convention will be half-day sessions covering a symposium on the chemical treatment of sewage and the presentation of an AudiVision feature (talking film-strip) on the subject "The Sweet Earth."

The symposium will include four outside speakers who are well qualified to discuss such pertinent topics as the removal of stream pollution, the evaluation of chemical treatment processes, the incineration of sewage sludge, and sewage plant control methods.

As chemical treatment processes promise to develop into substantial markets for new lime tonnage, every manufacturer should hear these discussions.

Much time and considerable thought have been given towards the preparation of the talking film-strip entitled "The Sweet Earth." The association's staff feels sure this new method of merchandising will not only be interesting but of real value in the further promotion of agricultural lime.

Other features will cover the relationship of the lime industry to the program of the Federal Housing Administration, the safety contest to be launched July 1, and, of course, the industry conference on NRA matters.

Phosphate Rock

THE TVA has delivered several carloads of the waste from its Southport mines and dry yards to one of the large mining companies here, and has taken in exchange some of the regular production of washed phosphate sand of that company, though it is not known on what basis the exchange was made. It is presumed that the sand is being briquetted at the Wilson Dam plant by TVA, as of course it could hardly be used in either electric or pyrolytic furnace, unless briquetted. Obviously this will not give any yardstick with regard to the possible increased tonnage that TVA lessors may expect whenever TVA starts taking the entire deposit, but it may at least serve as a means of learning how to utilize the waste sand when recovered.

Of course, in the present attitude of mind entertained by the great majority of fertilizer scientists, it would not be possible to consider using only the lump fraction for furnace use, and devote the fines to their natural outlet of direct application to soils adapted to profitable utilization, but it is yet hoped that the TVA in their extensive researches, will some day find that this is the simplest and best plan of procedure, thereby creating a great and active demand for Tennessee phosphate in a way not at all to interfere with Florida rock, or the present fertilizer industry.

Inquiries continue to increase for both rock and lands containing phosphate deposits, an increase is noted in actual spot sales of rock at normal prices, and rumor has it that several large tracts will soon change hands. Farmers seem to be generally in better frame of mind as to future prospects and everything seems to point to a good fertilizer season this spring, with active shipments to fertilizer manufacturers under way. TVA and other outside miners seem to be pushing their work to make shipments as rapidly as possible. Latest reports given the press by TVA, indicate following approximate shipments from various mines to the TVA plant at Wilson Dam, total: From Wheeler property Southport, loaded at Mt. Pleasant, 13,500 tons; from Perry by barge 3000, and other areas, 2000 tons. Total 18,500 tons.

Who Must Pay—Employer or Insurance Carrier?

Dust Hazard From a New Angle

By George D. McLeod,
Mining Engineer, Great Notch, N. J.

THE OWNER of an industry wherein the man-made dust hazard, pneumoconiosis, is evident, has more and more to worry about every day, especially if his dust is a silica dust and if his plant happens to be in one of the states whose compensation laws do not recognize silicosis as a compensable occupational disease.

He would like to know what can be done to solve the threatening economic aspect of his dust problem as related to silicosis.

On the one hand, he has the dust hazard menacing the health and future welfare of his workers. On the other hand, he is in the unfortunate position of becoming more open to damage suits at common law, suits that jeopardize the very existence of his industry. And lastly, the insurance carrier, who has in previous times accepted the liability of coverage for such pneumoconiosis in good faith, has started now, by different interpretations and misconstruing of one or two clauses in his standard policy, to dodge the liability.

The last twelve years saw a rapid increase in production in all industries. "Larger capacity" was the slogan of yesterday. In the production of crushed stone, this increasing of capacity kept in step with the other industries. New types of higher-speed crushers were installed. Vibrating screens replaced the revolving screens in many instances. Higher-speed drills were developed. Finally, the demand for finer sized aggregates brought in more secondary and finishing crushing with a rapid jump in the dust ratio and a corresponding increase in the dust hazard.

Silicosis, as a compensable industrial disease, has been recognized in very few states—possibly in three or four. Although the United States has been a very progressive nation in industry and commerce and has advanced far along technological pursuits, it has sadly lagged behind all the other countries of the world in social and health legislation for the workingmen. Consequently, the state compensation laws in most cases have not recognized dust hazards or have not as yet recognized silicosis as a compensable occupational disease.

The absence of any regulations regarding dust hazards has, naturally, led the industries to neglect dust control or, better still, dust prevention, and only when the dust contaminated the stone in stock, or when the chance of greater efficiency was in the offing, was any dust prevention thought of.

Now the quarry owner is practically "on the spot" if his dust is silica, and the insurance carrier is attempting, rather success-

fully, to deny the liability on his part of the insurance contract.

The quarry owner always believed he was completely covered by the standard policy—and he certainly was, because, up to within a few years ago, occupational disease claims were settled and no questions were asked. A different condition confronts the carrier now. Due to the steadily increasing number of silicosis claims, the carrier has contracted a bad case of "jitters," and has done all but run away from the scene by actually denying liability on his part of the contract.

By the use of different interpretations of one or two clauses in his standard policy, he has in several cases cleared himself and thrown the owner into a position of liability.

Up to a very few years ago, the "Standard Workmen's Compensation and Employers' Liability" policy without any of the new "Endorsements" or "Reservation of Rights Agreements" did cover occupational diseases completely, and the wording of the insurance clause at the beginning of the policy showed this "as respects personal injuries sustained by employees, including death at any time. . . ."

In Paragraph I (a) the carrier agreed to assume absolutely all the employer's obligation under the state workmen's compensation act.

In Paragraph I (b) the carrier agreed to cover all the liability not under the workmen's compensation law and agreed to indemnify the employer against loss by reason of liability imposed on him by law for damages on account of injuries referred to in the first clause, the insuring clause.

The insuring clause and parts (a) and (b) of Paragraph I were enough to give peace of mind to the owner, and they did, as long as silicosis cases were not so frequent.

The last few years, with their increase of dust hazard and numerous unemployed—lawyers and workmen—have made the workman "silicosis minded," and many workmen long retired from work as well as many still working have become silicotics—and I mean by this *bona fide* cases of silicosis. The surge toward redress increased so rapidly that the carriers were seriously threatened, and ways and means were found to try to avoid liability.

Now Paragraph 7 was in fine shape to get in an opening wedge. Although it was there originally, nobody paid much attention to it; but now, upon reading it over, we are astounded by the fact that "this agreement shall apply only to such injuries so sustained

by reason of accidents occurring during the policy period. . . ."

This paragraph was never brought up before for argument because the employer always assumed that he was covered broadly by the insuring clauses in the first part of the policy.

The word "accidents" is one point that argument is winning for the carrier, and has already helped in several cases when a good insurance lawyer has interpreted to a misinformed court.

Another way was made to help get out from under by the carrier—by obtaining a small additional increase in the loading for each classification because of the threatening avalanche of common-law occupational losses. It was noticed also that when this was done, the policy did not have to be endorsed to give coverage to occupational diseases. This fact alone is a confession by the carrier that the policy did give the proper coverage.

Again the carrier's losses were mounting, and again the loading was increased—but the carrier was very gracious about the matter this time and said to the policy holder, "If you will pay the added loading, we will endorse the policy to extend the coverage to your industrial occupational diseases; however, if you will not pay it, we will not complain but will have to put on an endorsement excluding occupational diseases."

Then, to clinch his clauses of avoiding liability, the carrier slipped in that joker of jokers, that the occupational disease endorsement covered claims "resulting in occupational incapacity necessitating cessation of work during the period of the policy only."

Most of the cases of silicosis do not become acute nor does the condition develop to complete incapacity or death until long after the man leaves the job—hence, after the policy period.

As a rule, the silicotic doesn't have to cease work during the policy period, nor, as a rule, is he incapacitated during the time of the policy period.

Lastly, the carrier, in an attempt to stave off the employer's going to law, has approached the employer with a "Reservation of Rights" agreement, whereby, if the employer will sign a reservation of rights agreement, the carrier will take on his case and defend the employer, to see who is really liable. Of course, the carrier will put in delay after delay until a precedent might be set by some other case being won by the carrier.

All the preceding facts have made it very uncertain for the owner of a legitimate

silica operation in a state where silicosis is not recognized as a compensable occupational disease. The owner feels he is "on the spot."

The question is, "What can be done about it?" The employe must be protected. The owner must be protected by his dust hazard being recognized as an occupational disease, compensable by the state compensation laws.

Opinion must be solidified among all industries having a silicosis hazard, whereby pressure must be brought to bear to force enactment of proper legislation to place economic responsibility for this condition.

The standard policy must be cleared of the present endorsements. How can this be accomplished?

After years of experience as both a mine operator and a quarry operator, the author cannot agree with the opinion that some dusts are harmless and even beneficial. Any dust, especially silica, once entered into the lungs is damaging, and the sooner the industry recognizes this fact instead of avoiding it like the proverbial politician's "hot poker," the sooner will the industry become straightened out as regards dust control, allowable dust count, recognition of silicosis by state compensation laws, re-rating of the hazard and the standing of the carrier.

The operator, too, has a moral responsibility towards his employers and the rising standard of education in making the worker sit up and take more notice that he might become a silicotic.

Dust, like the poor, we will always have with us to some extent in the industry, and it is the duty of the operator to minimize

it, just as it is the duty of the state to insist on its being minimized or eliminated.

There is a great field for research for the engineer to fight this hazard, and it will be eventually eliminated or cut to a minimum. But, in the meantime, the owner must be protected from the carrier.

Sand and Gravel News

Gifford-Hill Co., Dallas, Tex., recently dismantled its Forest Hill, La., plant and built another nearby. The source of material was too far from the original plant, making it necessary to pump over 1000 ft. with the aid of a 10-in. Amsco booster pump midway in the line. It was decided that it would be cheaper to build a plant nearer the source of material than to pump this excessive distance. The new plant started operating March 5, 1935. A 12-in. Amsco dredge pump, with a 10-in. discharge, pumps the material about 150 ft. to flat gravity screens, where the finest sand is separated and flows by wooden launder to a sump as waste material. On demand, the dredge could repump this material. The dredge *Catherine* is electrically powered and the pump is driven by a belt to a 300-hp. G.-E. induction motor. A 30-in. Link-Belt belt conveyor, 175 ft. centers, takes the scalped material to the screening plant, where Telsmith rotary screens, 18 ft. long, separate the gravel into sizes below $\frac{1}{4}$ -in. and between $\frac{1}{4}$ -, $\frac{1}{2}$ -, 1-, $1\frac{1}{2}$ - and 2-in. The material passes directly through launders into railroad cars. Two grades of sand are produced, common concrete, and mortar or mason, sand. The sand is handled through

a separate sand-settling hopper, and the size desired is discharged on to a conveyor belt for loading. Before this plant was built, overburden was taken in with the sand and gravel for separation, but the 10 to 12 ft. of overburden is now stripped by a Northwest drag-line, Model 105, with a 1-*yd.* bucket, driven by a 6-cyl. Wisconsin gasoline engine. The capacity of the plant is 15 cars (50 tons to a car) of gravel a day, or 400 to 450 cars a month. The boat is equipped with an Amsco cutter, which is handled by a Clyde hoist. The wash water of the plant is supplied by a 6-in. Chicago pump.

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Prices Bid—Contracts Let

Bellefontaine, Ohio: Bids on 2000 tons of crushed stone for city streets: 75c per ton, f.o.b. plant; \$1.30 delivered on streets.

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Akron, Ohio: Bids on 10,075 cu. yd. of gravel for Sand Run Reservation, L. L. Kinsey, approximately 9c per cu. yd.; J. P. Loomis Co., 15c. The low bid has been protested on the ground that the bidder is not operating under the code.

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Milwaukee, Wis., central board of purchases, threatens to put the city in the sand and gravel and crushed stone business because of uniformity of bids. One company recently bid \$1.09 per cu. yd. on gravel and 20 bids at \$1.30 were received at the same time.



New plant of Gifford-Hill Co. near Forest Hill, La.

Plant for Working Thin Sand and Gravel Deposits

By Edmund Shaw,
Contributing Editor, Rock Products

THE WORKING of thin sand and gravel deposits is to be avoided, of course, so long as better deposits are available. But there are localities where such deposits must be worked if aggregates are to be sold at a reasonable price. Experience in such places, in Oklahoma, Texas and some other states, has shown that it is more economical to move the plant to the bank, as the excavation proceeds, than it is to transport the material through a rapidly increasing distance. Equipment for such operations is in use, but usually it is "home-made" and designed to use machines in hand.

The most carefully designed equipment for such work that has been brought to the writer's notice is that used to make aggregates for part of the lining of the Metropolitan Aqueduct, which is to bring water from the Boulder dam to Los Angeles and other southern California points. It is now working near Mecca, Calif.

The deposit is flat and 6 to 8 ft. deep.

Excavation is by a Bucyrus-Erie 52-B 2½-yd. electric shovel discharging to a portable plant which moves along with the shovel under its own power.

The shovel discharges on a bar grizzly with 8-in. spaces over a 4½-yd. hopper. Oversize runs across a plate above the hopper and discharges into a truck and is removed. (Ground space is kept clear to accommodate the deposit of finished materials.) The undersize goes through a feeder to a conveyor belt that takes it to the plant. Hopper and grizzly are on a frame which is on casters, and the end of the conveyor frame is attached to it by a swivelled joint so that it can move freely. The hopper is also attached to the electric shovel, connection being by a rigid bar which holds the hopper at just the right distance for the shovel to discharge into it conveniently.

The belt is 30-in. wide, and the frame which carries it can be swung through 180 deg. The discharge end is pivoted over the

feed end of a 20-ft. horizontal vibrating screen that makes four sizes of gravel and two sizes of sand. The oversize rejects go to an Austin-Western jaw crusher, 9x40-in. opening. The crusher discharges to a vibrating screen of the same type, and making the same sizes, as the main screen, but somewhat shorter.

The products of both screens go to hoppers which feed on to boom conveyors extending out from the plant. As the plant moves along, the discharges from these conveyors leave the sized materials in windrows, and the length of the conveyors is varied so that the windrows of the different sizes of material are kept separate. Trucks are loaded from these windrows to take the materials to the concrete plant by a grizzly loader, which carries a vibrating screen of the same type through which the discharge of its bucket elevator passes.

This material does not need washing, but the equipment is designed and built so that washing sprays and sand washers can be quickly and easily added. The plant can travel on a highway and when arranged for the highway the clearance is only 13 ft. 6 in., permitting it to pass under trolley lines and bridges.

The plant was designed and built by the Los Angeles branch of the Stephens-Adamson Manufacturing Co.

Sand and Gravel

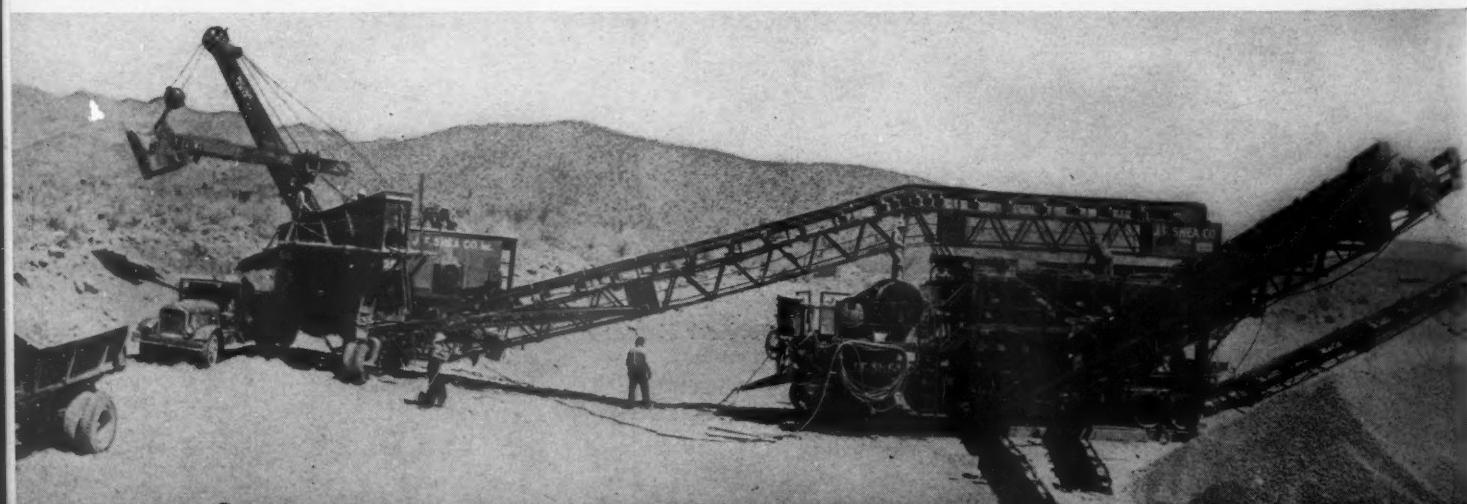
McGrath Sand and Gravel Co., Chillicothe, Ill., recently installed a 100 ft. centers, 48-in. conveyor belt to be used as a picking belt, to further raise the quality of its product. It runs at 130 ft. per min.



Grand Coulee Dam, Wash.; Federal Government has condemned 360 acres near the dam site for a gravel supply. The deposit will be developed by the dam(n?) contractors.



Above: Specially designed movable plant for working shallow sand and gravel deposit. Below: Another view; this is a dry plant used to furnish material for Los Angeles Metropolitan aqueduct





Storage of materials is in windrows parallel to working

Mt. Vernon Sand and Gravel Co., Mt. Vernon, Ohio, suffered a loss of several thousand dollars on April 26 when the wooden superstructure carrying the screens collapsed. No one was injured. The possibility of a failure had been noticed and repairs were about to be made.

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Gadsden Sand and Gravel Co., Gadsden, Ala., which has been inactive for the last two or three years, resumed operation in May, chiefly to furnish material for PWA projects.

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Southern Sand and Gravel Co., Selma, Ala., whose tugboat sank in the Alabama river in October, 1934, with the loss of two lives as the result of hitting a bridge pier, has been shipping from stock pile since then. The sunken tugboat has been sold to the government. In the meantime the company has located a dry pit deposit of sand and gravel about a mile from its plant, which is to be developed as soon as business justifies. Tests show the deposit has an average overburden of 3 ft. and extends to a depth of 20 ft. Draglines will be used for stripping and opening the pit; then it is planned to use a pump dredge. Material will be hauled to the present plant at the start; but it is planned to build a movable plant to follow the dredge.

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Bedford-Nugent Co., Evansville, Ind., has purchased the **Henderson Sand and Gravel Co.**, Bedford, Ind., for a reported price of \$25 000. The new owner will continue operation. W. C. Cooper, local manager, will remain in charge.

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Slag

Standard Slag Co., Youngstown, Ohio, began operation of its new plant at Riverside, near Wheeling, W. Va., May 1. The company will produce a line of products for road making, including bituminous mixtures. It has a convenient outlet upon the Ohio River division of the Baltimore and Ohio Railroad. The plant was formerly situated across the river.

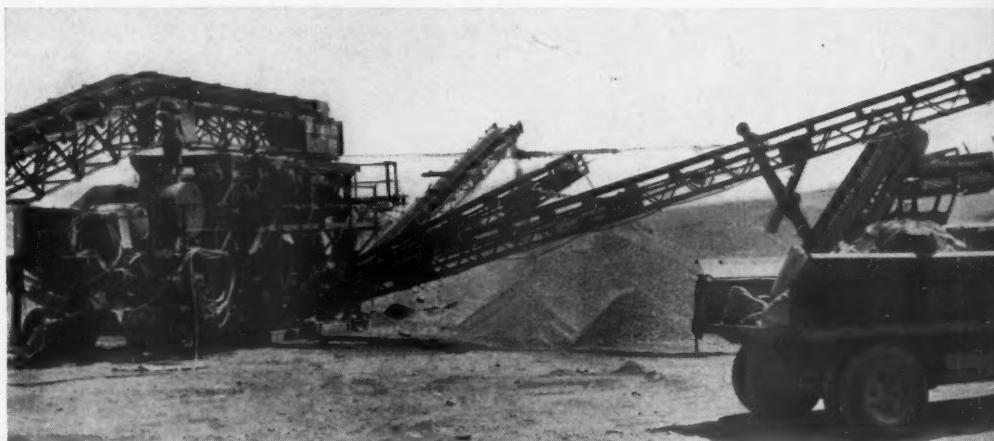
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Rock Asphalt

Huffy Rock Asphalt Co., Liberal Mo., is reported in active operation.

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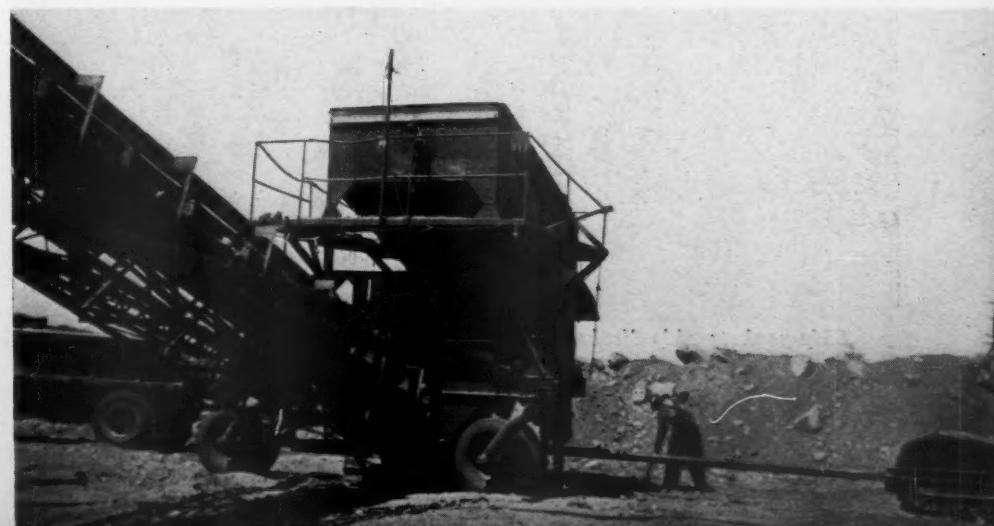
Utah State Highway Commission, Salt Lake City, Utah, has opened a rock asphalt plant near Vernal, of 200 tons daily.



Loading space for trucks



Grizzly showing pneumatic-tired "castors"



Hints and Helps for Superintendents



Simple Skip and Pocket

THERE ARE many different schemes for automatically dumping a skip, but most of them are too elaborate and costly for small test pit work. In the photograph the bucket is elevated from the shaft on inclined skids. Above the dumping position of the bucket are two slots cut in the skids. These are closed when the bucket is coming up the shaft. On the sides of the bucket and below the bale, and also below the center line of the cylindrical bucket, are two lugs about 4 in. long. When the bucket has been elevated above these lug-openings, the operator, by means of a wire or cord, opens these lug-slots and then lets the bucket back down. When the bucket is lowered in this fashion, the lugs on the sides of the cylinder slip into the lug-slots and the loaded bucket then becomes off-center and automatically tips itself into the skip pocket.

To lower the empty bucket into the pit the bucket is raised a few feet above the lug-slots, they are closed by the operator via the wire or cord, and the bucket slides on down into the pit.

The skip pocket shown is just wide enough to accommodate the bucket and its guides. It is built just high enough for a car to



Skip in discharging position

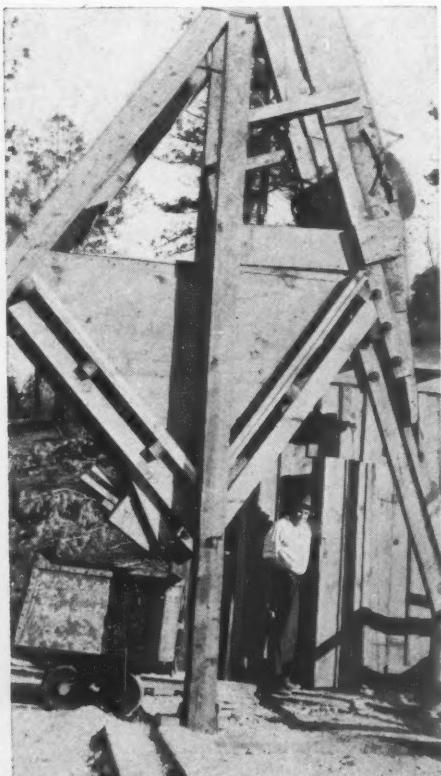
receive its content. The whole arrangement can be built on suitable skids so that the skip pocket and all can be moved from place to place when doing exploratory work.

Novel Compressor Installation

A WESTERN SAND AND GRAVEL operator had an opportunity to rent his portable compressor to a contractor. The contractor wanted to use the compressor about two hours each day, and as the sand and gravel producer did not use his machine all the time an arrangement was made whereby the two parties used the same compressor in a very efficient manner.

Two platforms were framed. One platform was placed at the contractor's job and one at the sand and gravel producer's plant. These platforms were built the same height as the platform of a truck body. The Gardner-Denver compressor was installed on top of one of the platforms and used from that position.

Thus in essence the scheme resolved itself into the contractor using the equipment a few hours, after which a truck would be backed up to the platform and the compressor hauled about a mile to its other place of use, where the compressor would



Skip pocket; skip discharging

be unloaded to the second elevated platform. In this manner, two men could load, deliver and unload the compressor at its two places of use.



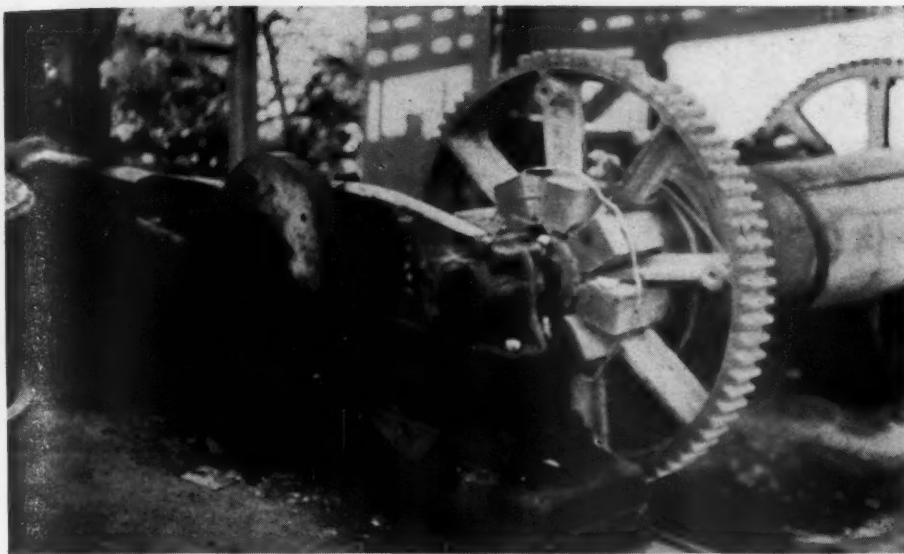
Air compressor at gravel plant

Crusher Lubrication

AT THE Middlefield plant of the Connecticut Quarries Co., Inc., a new 48x60-in. Farrel-Bacon jaw crusher recently installed is provided with three forced-feed lubricators that were at one time used for lubricating a set of rolls. Instead of using grease cups on those bearings that are stationary, the large capacity cups shown were installed near the crusher feed hopper so that the crusher operator could force grease to the bearings without having to go below. Each cup holds about one quart of grease and is connected to its bearing by a $\frac{1}{2}$ -in. pipe.



Grease cups for pressure lubrication



Old steam hoist serves as source of compressed air

Old Steam Hoist Used as Air-driven Car Puller

WHEN a car puller was needed at the plant of the Cerulean Stone Co., Cerulean, Ky., it was decided to use an old, discarded steam hoist for the job. However, the use of steam had been discontinued at the plant in favor of Diesel operation, and it would have been uneconomical to provide steam for operation of one piece of machinery. It was therefore decided to run the hoist with compressed air and the hook-up was made. The result was entirely satisfactory as the car puller has plenty of power to pull several cars at a time and its operation is not expensive.

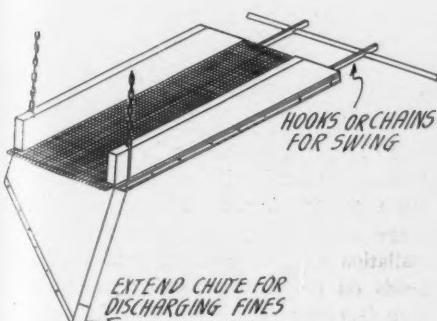
Small Portable Grizzly

(Contributed by a Superintendent)

WE were having some trouble with dust in our stone. Regardless as to how well it was screened out at the screening plant, there would be an accumulation of dust at our loading bins, especially while emptying the bins.

We constructed the small portable screen which can easily be moved by two men from one gate to another, and by attaching a small spout, or chute, the fines are passed off over the sides of the car out of the way.

Since installing this screen we have had no difficulty with an excess of dust.



Home-made portable grizzly takes dust out of stone as loaded for rail shipment

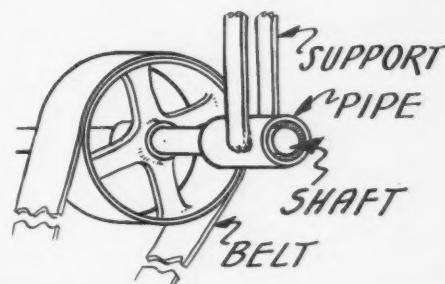


Shaft End Protection

By J. Palmer Camm
Watonga, Okla.

IN LOOKING OVER our plant for any possible accident hazards, we noticed two shafts, the ends of which extended a foot beyond the bearings. Modern safety practice meant that these shaft ends had to be cut off or guarded suitably.

Now, around any plant driven by belts, pulleys and shafting, one never knows when that particular shafting would be needed, exactly where the cutting was to be done. In fact we had previously used one of these shaft ends. Therefore, we decided to guard the shaft ends. To do so, we picked up some scrap pipe larger than the shaft to be guarded, and slipped this pipe over the shaft end, supporting it in such manner that it would not drag on the shaft.



Shaft end protected



Cheap power for reclaiming drag scraper



Another Method of Concentrating Limestone*

Beneficiating Cement Raw Materials by Agglomeration and Tabling—Experiments for Universal Atlas Cement Co.

By F. P. Diener,¹ J. Brune Clemmer² and S. R. B. Cooke³

THE LIMESTONE DEPOSIT utilized by one of the plants of the Universal Atlas Cement Co. is covered in part by a stratum of cherty limestone. If this overlying deposit could be utilized by removing the excess of chert economically, quarry costs could be reduced and the amount of rock economically available would be increased greatly. On account of the distribution of flint and limestone, a product fairly free of flint can be obtained until the quarry face is about 50 or 55 ft. high. As the face is worked farther back into the hill, the comparatively clean stone is overlain with a constantly increasing amount of high-flint limestone. If this flint remained with the limestone, there would be a prohibitively high silica ratio in the finished cement; if the flinty layer were removed as overburden a very large tonnage would be handled and much good stone lost. Consequently it was felt that means should be devised for separating the flint from the limestone after it reaches the plant.

The investigation was undertaken by the Mississippi Valley Experiment Station of the United States Bureau of Mines in co-operation with the Universal Atlas Cement Co. and the Missouri School of Mines and Metallurgy, Rolla, Mo.

Consideration of Processes

Many schemes for the separation of minerals are based on differences in the specific gravities of the minerals to be separated. In this case the flint has a specific gravity of approximately 2.62 while the limestone aver-

ages about 2.70. This differential is not large enough to permit separation by any method based on specific gravity. Furthermore, all the limestone particles in any given sample are not alike; usually about 10% of them have a specific gravity the same as, or lower than, the flint.

Magnetic and electrostatic methods of separation were found to have no application. Therefore, attention was directed to methods in which the surfaces of some of the particles are rendered water-repellent by chemical means, followed by separation of the water-repellent particles from the non-water-repellent ones on concentrating tables or in flotation cells.

Tabling and Flotation

Both flotation⁴ and tabling and agglomeration⁵ have been shown to be effective for the separation of calcium phosphate from quartz in the Florida phosphate field. Probably the first application of flotation to a limestone separation was made in a study of tailings from iron ore concentration.⁶ These tailings contained calcite and quartz, and the separation was made in order to isolate the calcite and combining it with the iron concentrates to form a self-fluxing ore. In the cement industry the only application of flotation known to the authors has been at the Valley Forge, Penn., plant of the Valley Forge Portland Cement Co.⁷

Where the principle of selective water-repellency is used in conjunction with concentrating tables the process is referred to as agglomeration and tabling. In applying such a method to a limestone-flint separation the process consists essentially of adding to a given mass of stone just enough water to wet the particles and then treating the slurry with a solution of a soluble soap. The limestone particles become coated with insoluble calcium salts of the fatty acids in the soap, usually calcium oleate or calcium stearate. At the same time or subsequently, the ore is treated with an oil whereby the oleate—or stearate—coated particles acquire an oil coating. The flint particles are unaffected by either of these reagents in the amounts used. This step, referred to as agglomeration, is followed by tabling on an ordinary concentrating table of the Wilfley or similar type.

The action of the material on the table is quite unlike that in ordinary table concentration, in which there is simply a stratification of low-and high-gravity particles, with the two discharging at different points along the table. In the agglomeration process, the oiled limestone particles, once they are

worked to the surface by the pulsating action of the table and the flow of water across the riffles, actually float on the surface of the water and pass over the side of the table. The unoiled flint particles follow the riffles and come off the end of the table. This is the reverse of customary gravity separation.

In applying this selective water-repellency principle to flotation, the stone, in a form of a slurry containing about 20 to 30% solids, is conditioned with a small amount of oleic acid. The limestone particles become coated with water-repellent calcium oleate, whereas the flint particles remain unaffected. The slurry then is run into the flotation cell, where a separation is made between the stone and the flint. The limestone particles are floated to the surface and accumulate in a froth which may be removed by a mechanical scraper. The flint particles remain in the cell and are tapped off continuously from the bottom. Other reagents, such as pine oil, cresylic acid, soap, or an alkali, may be added to the flotation cell to enhance the separation. Both tabling and flotation as described above are used in the Florida phosphate field.

Selective Filming or Agglomeration Followed by Tabling

Tabling and flotation achieve the same results in the actual separation of flint from limestone. The choice between the two depends on the size of the material to be handled. In the laboratory where miniature tables were used, 10-mesh was the maximum size that could be handled satisfactorily. However, tests indicated that 6-mesh material may be handled on a commercial-size table. Particles larger than 6-mesh probably have too large a ratio of mass to surface to be supported on the water film. Material as fine as 200-mesh can be handled on a table, but below 65-mesh the table capacity is low and trouble is encountered with agglomeration of particles that block the riffles.

In general, in tabling the larger particles, a certain portion of so-called "middlings" comes off the table between the clean flint and clean limestone. In continuous operation these middlings would be reagglomerated and tailed.

Flotation may be applied successfully to material of 65-mesh and finer. In general, table concentration is less costly per ton of stone treated because it requires cheaper reagents and less power and has a lower installation cost. The choice, accordingly, depends on the size of particles, and this in turn depends upon the size at which the minerals to be separated are liberated.

*Reprinted from U. S. Bureau of Mines Report of Investigations 3212.

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⁴Lawrence, H. M., and DeVaney, F. D., Flotation of Low-Grade Phosphate Ores: Rept. of Investigations 2860, Bureau of Mines, 1928, 4 pp.; Lawrence, H. M., and Roca, E., Flotation of Low-Grade Phosphate Ores—II: Rept. of Investigations 3105, Bureau of Mines, 1931, 9 pp.; Coghill, W. H., and Clemmer, J. B., Soap Flotation of the Nonsulfides (Limestone, Phosphate, Bauxite, Fluorspar, Rhodochrosite, Manganese Oxides, Barite, Siderite, Chromite, Scheelite, and Ferberite, and Cyanite); Am. Inst. Min. and Met. Eng., Tech. Pub. 445, 1932; Henrichs, C. E., Economic Results of the New Technique in Phosphate Recovery: Min. and Met., vol. 14, August, 1933, pp. 329-32 and 350; Martin, H. S., Milling Methods and Costs at the No. 2 Concentrator of the Phosphate Recovery Corporation: Am. Inst. Min. and Met. Eng., Cont. 51, 1933; Barr, J. A., The Development and Application of Phosphate Flotation: Ind. Eng. Chem., vol. 26, 1934, pp. 811-15.

⁵O'Meara, R. G., and Pamplin, J. W., Selective Oiling and Table Concentration of Phosphate Sands in the Land-Pebble District of Florida: Rept. of Investigations 3195, Bureau of Mines, 1932, 6 pp.

⁶Lee, Oscar, Flotation of Limestone from Siliceous Gangue: Rept. of Investigations 2744, 1926, 3 pp.

⁷Rockwood, N. C., Chemistry Applied to Cement Manufacture: Rock Products, vol. 37, No. 8, August, 1934, pp. 32-7.

In the stone investigated, the flint and limestone are liberated at a size larger than 6-mesh, so that the stone is well adapted to table concentration, and only the material finer than 65-mesh requires treatment by flotation.

Both methods of concentration produce concentrates with less flint than is necessary for use as a raw material. The concentrates as a rule average about 1.7% of silica, whereas about 4.0% is permissible in the raw limestone material. For this reason it is not necessary to subject all the stone to concentration.

In the laboratory the following reagents, expressed in pounds per ton of stone treated, gave successful results on material prepared through 10-mesh:

Soap	1.0 lb. per ton
Oil	4.0 lb. per ton
Soda ash	0.5 lb. per ton

The soap was crude sodium oleate; the cheapest grade will serve the purpose. The oil used is the cheapest grade of crude or fuel oil.

In the commercial application of agglomerating and tabling in the Florida phosphate field it was found that after the water had been circulated for a while the commercial requirements were about one-third to one-half of those required in the laboratory.

It is possible to overoil a sample, in which case some of the flint particles may become lightly oiled and wash over the riffles of the table to contaminate the limestone concentrates. The use of a small amount of soda ash tends to keep the flint free of oil.

In common with ordinary table concentration better separation is obtained if the size range of the particles on the table is not too wide. A range of not more than three sizes in the standard screen scale is desirable.

A 10-mesh sample of stone containing 14.5% of insoluble was classified in a laboratory hydraulic classifier, making three sizes and a slime product. The results are shown in Table 1.

Each sand size was agglomerated and



Experimental concentrating table used in the work for Universal Atlas Cement Co.

taled, using the above reagent charge. The slimes were dewatered and dried for analysis but otherwise untreated. The table separation on each size was good. Tabling the coarse sand product gave a small quantity of middlings, which in commercial practice would be returned for retreatment. In the calculation of the final results these middlings were divided between the concentrates and tailings in proportion to the analyses of the three products. Table 2 gives the results of this test.

The composite of the three table concentrates and untreated lime account for a recovery of 95.1% of the total CaCO_3 in a product of the following analysis: SiO_2 , 3.45%; Fe_2O_3 , 0.63%; Al_2O_3 , 0.31%; CaCO_3 , 90.85%, and MgCO_3 , 4.11%.

A sink-and-float separation of limestone and flint using a solution of acetylene tetrabromide with a specific gravity of 2.65 showed that flint-free limestone contains 1.3% of inherent insoluble and the clean flint

contains 92.1% of insoluble. When these values are taken into account, it is obvious that the table concentrates contain 99.5% of limestone and 0.5% of flint, whereas the table tailings contain 11.0% of limestone and 89.0% of flint, indicating a recovery of 97.6% of the limestone in a concentrate of suitable grade.

Summary

Flint can be separated from the limestone in a cement raw material by agglomeration and tabling. The stone is treated with small amounts of soap and oil, which produce an oil coating on the surface of the limestone particles and leave the flint surfaces unaltered. Following oiling, the ore is tabled; the flint is separated almost perfectly from the limestone. The size of particles for treatment should be between 6- and 65-mesh. Finer material may be cleaned more economically by froth flotation. The limestone from the concentrating tables has a lower flint content than is necessary for plant use; consequently, the finer portion need not be treated, and flotation can be omitted.

TABLE 1—CLASSIFICATION OF 10-MESH STONE

Product	Per-cent of total	Assay, per cent				
		SiO_2	Fe_2O_3	Al_2O_3	CaCO_3	MgCO_3
Original stone	100.0	14.51	0.58	0.41	80.02	3.92
Coarse sand	48.7	16.39	.46	.29	78.94	3.19
Medium sand	20.9	15.99	.45	.33	80.00	2.70
Fine sand	10.5	12.23	.52	.30	82.32	3.86
Slimes	19.9	9.58	1.09	.83	81.48	7.01

TABLE 2—TABLING OF CLASSIFIED 10-MESH STONE AFTER AGGLOMERATION

Classifier product	Concentration product	Weight, per cent	Assay, per cent				
			SiO_2	Fe_2O_3	Al_2O_3	CaCO_3	MgCO_3
Coarse sand (48.7%)	Concentrates ..	79.7	1.52	0.48	0.16	93.70	3.30
	Tailings	20.3	77.02	.35	.81	19.00	2.73
	Composite ..	100.0	16.85	.45	.29	78.54	3.18
Medium sand (20.9%)	Concentrates ..	78.6	1.41	.46	.13	94.45	2.83
	Tailings	21.4	69.56	.41	1.09	26.85	2.24
	Composite ..	100.0	15.99	.45	.33	79.98	2.70
Fine sand (10.5%)	Concentrates ..	80.2	1.93	.49	.10	93.01	3.54
	Tailings	19.8	53.96	.64	1.02	39.00	5.15
	Composite ..	100.0	12.23	.52	.28	82.32	3.86

NOTE: The slimes were not treated.

Rock Products News

John T. Thorndyke, Taft Building, Hollywood, Calif., has located a deposit of wollastonite, the only calcium silicate to occur naturally, near Code Siding on the Owens Valley branch of the Southern Pacific R. R., in the Rademacher district, Kern County. Mr. Thorndyke has developed an electric-arc process with which he is experimenting on the preparation of rock wool from this wollastonite with encouraging results. No fluxing material is needed.

◆ ◆ ◆

American Cyanamid Co., New York City, has started construction of a bauxite plant near Little Rock, Ark.

Prospects in the Manufacture of Rock Wool

One of Many Subjects of Interest to Rock Products Producers at Illinois Mineral Industries Conference

THE THIRD ANNUAL mineral industries conference of Illinois, at Urbana, May 17 and 18, provided a program full of interest and value to rock products producers and manufacturers, yet the industry was very poorly represented. Cement and lime manufacturers could have obtained a great deal of value from the sessions on coal and its use. The papers on rock products were also helpful, and there was considerable discussion. Seldom do producers have an opportunity to question the geological survey experts on all phases of their problems, as they had in this instance.

Although portland cement is one of the principal mineral products of the state, only one of the companies operating in Illinois was represented at the conference—the Marquette Cement Manufacturing Co., Chicago. This organization was there in force—W. A. Wecker, president; D. S. Colburn, vice-president; Frank Moyle, general superintendent; C. M. Butler, chief chemist, all of whom expressed the opinion that their time was well spent. Not a single lime manufacturer was present.

A good many of the subjects have been discussed quite fully in *ROCK PRODUCTS* recently; so, for want of space, only one subject—rock wool—will be referred to here. This product is attracting attention from many lime, cement and crushed stone producers; and the discussion at Urbana was probably the first general session ever held on this interesting product. It is expected that this paper, with the others delivered, will eventually be published in book form, so only an abstract is given here.

Rock Wool

Charles F. Fryling, chemist, Illinois State Geological Survey, has been devoting much time to a study of all phases of the rock wool industry; here is his summary:

"One of our purposes in undertaking research in rock wool has been that of fostering the establishment of mineral industries.

"In order to secure a material which can be melted and blown into wool, it is necessary that the acid and basic constituents of the rock be fairly evenly balanced. A simple way of determining this is to find out whether the carbon dioxide content of the rock lies between 20 and 30%.

"The final product consists of silica, alumina, lime, and magnesia in combination. The relative amounts of these have been determined experimentally and are diagrammatically plotted as a four component system. One important thing revealed by this is that the properties of rock wool are uniquely determined by composition and blowing conditions. Therefore, provided that the composition is correct, it makes no dif-

ference whether the wool is produced from a wool-rock, a mixture of rocks, or from some other material such as slag. A slag wool and a rock wool, of the same chemical composition and blown under the same conditions, would be indistinguishable.

"Rock wool has many advantages compared with other heat insulating materials.

"(1) On the basis of its coefficient of heat transfer, rock wool is the best commonly available heat insulating medium.

"(2) Except when used at very high temperatures, it should last practically forever.

"(3) Compared with certain organic materials, it is extremely resistant to moisture, and consequently its insulating properties show less tendency to fluctuate with changing weather conditions.

"(4) It is thoroughly fireproof and vermin-proof. This is of importance from the standpoints of health and insurance rates.

"(5) It can be fabricated in all three forms demanded by the building industry. These are: loose fill, rigid board, quilts.

"(6) Its properties are such that it is an excellent acoustical insulation material. In this connection it is interesting to recall that 3500 tons of it were used in insulating the radio broadcasting studios in Radio City.

"(7) It is relatively inexpensive and the indications are that it can be produced more cheaply than it is at present.

"Although finding considerable use in industry for refrigeration and heating insulation, everything indicates that rock wool will find its widest use in the insulation of buildings. It can be expected to contribute towards better health by equalization of room temperature and elimination of drafts, increased comfort in both summer and winter, and reduction of vermin and fire hazards. It will also contribute materially towards the economical use of fuels.

At the present time there are about thirty producers of mineral wool. This includes the producers of both slag wool and rock wool, as well as at least one firm which produces a mineral wool using soda-lime glass as the raw material.

"The tardy recognition of the value of insulation in homes has been a serious drawback to the industry. The indications are that this handicap has been completely surmounted, and it is possible to look forward with confidence to a widespread increase in the use of insulation for building.

Need More Chemical Control—Like Cement Industry

"Probably the most serious factor in the situation has been the lack of what might be termed 'industrial refinement' within the industry. Yields fluctuate and the quality of

the product has never been standardized. As far as we know, no one has ever attempted to subject the manufacturing process to accurate analysis for the purpose of securing improved efficiency of operation. Published information regarding the limits of suitable composition was inadequate until the publication of our Illinois Geological Survey Bulletin No. 61. The composition of the raw materials used was allowed to fluctuate because of lack of adequate analytical control. This has had the effect of keeping the industry in 'hot water' and has prevented any serious attempt at rationalization. The only remedy for these conditions is to subject the whole process to the kind of rigorous control that has been so successfully practiced in the portland cement industry.

"Important questions for the prospective producer of mineral wool are the following: What is the probable market for mineral wool? How much will it cost to build a plant? What will be the cost per ton of wool? How much will the fuel cost? In seeking to give an answer to these questions, it should be realized that accurate figures can be obtained only from complete cost data.

"On the basis of the number of buildings which could be profitably modernized, and the probable new construction, it has been estimated that there is an annual market for 11,700,000,000 sq. ft. of insulating materials.

"Apparently mineral wool has captured at least half, if not more, of the building insulation business. Subsequent to 1933, the business has witnessed renewed activity, and has expanded beyond its predepression high. It does not seem unwarranted to expect a \$100,000,000 per annum figure to be attained within the next five years.

Method of Manufacture

"Cupolas, about 5 ft. in diameter and 15 ft. high, are used in manufacturing rock wool. A mixture of rock, or slag, is fed into the top of the cupola, and a molten mixture of silicates flows out at the bottom in a steady stream. Combustion is supported by a blast of air fed into the bottom of the cupola, which in many respects resembles the type of equipment used for melting cast iron in foundries. A temperature of about 1500 deg. C. is maintained, and the walls of the furnace are cooled by a jacket filled with water. A steam blast, issuing from a trough-shaped nozzle at a pressure of about 100 lb. per sq. in., is directed at approximately a right angle to the stream of flowing slag. The molten slag is broken up into innumerable small droplets, which are propelled into a collecting chamber. During its flight through the air, each little droplet drags out a small thread of material which solidifies before falling to the floor.

"The raw material must not be so fine that it blows out of the cupola or plugs it up. It is best to use an assortment of various sized lumps in order to prevent excessive channeling within the cupola.

"A small amount of oil is added to the steam used for blowing in order to reduce dust, secure better cohesion, and to produce a more water-resistant product.

Finished Product

"The crude wool can be fabricated into the various forms required by trade. It can be ground in special equipment in order to produce a refined product for blowing between walls; it can be loosely compressed to the form of blankets, inserted into ready-built forms, sewed up between paper or wire netting to form quilts, or fabricated into plasters or bricks. One difficulty encountered in fabricating mineral wool is caused by the low heat conductivity of the material, which makes drying very slow. For this reason it is essential to keep the wool fairly dry during the blowing process.

"It is more than probable that all mineral wool plants now in operation are antiquated. Chief difficulties encountered are high and variable fuel consumption, wide variation in quality of output, and inability to maintain continuous operation.

"These difficulties can be largely attributed to the fact that the manufacturing procedure now used is very empirical, and no effort to establish close control of the raw materials is attempted. Rocks, *which are thought to be of the proper composition*, are used, and temperature is controlled according to the whim of the operator. It is therefore necessary to provide some degree of chemical control.

Greater Efficiency Possible

"It is possible to suggest certain ways in which the efficiency of the present type of equipment might be improved; but before these are undertaken, an accurate heat balance for the process should be secured. Apparently the cupolas have not been designed with an eye to heat economy, for the rock can be melted much faster than it can be blown. It would not seem impossible, however, to blow two or three streams simultaneously from the same cupola. At the same time, the possibility of using the heat, now wasted in cooling the cupola, should not be overlooked. The U. G. I. producer gas generator, according to Haslam and Russell, utilizes the water cooler for the generation of steam. The possibility of effecting this economy should be investigated by a competent engineer.

"A means of following the temperature of the slag stream should be provided. Those factors regarding safety should also be taken into consideration.

"It is quite evident that present methods are rather limited as regards the range of compositions which can be employed, the type and size of raw material, and the extent to which mixtures of raw materials can be

accommodated. A method which could use mixtures, say, of limestone and shale, would enjoy several advantages.

"The location of the plant could be decided entirely on economic consideration and independently of the occurrence of wool-rocks, since deposits of shale and limestone are very abundant.

"It would be possible to produce a product of predetermined composition. B. C. Simpson of the Owens-Illinois Glass Co. states: 'Tests have definitely shown that the percentage of silica contained in a mineral wool is the primary ingredient contributing to long life and permanence. The higher the silica content, the greater the permanence. Mineral wools fall into two classes—those manufactured from natural ores or rock, and those manufactured from specially compounded ingredients. By compounding the batch, the amount of silica can be held constant at the maximum point; while if a rock is used as it occurs in nature, considerable variation in the silica content is encountered. The amount of silica usually runs much lower in this type of material than in the compounded type.'

"Unless one has had actual operating experience and is thoroughly conversant with the process, it would be rash to build a plant right off. In the development of any industry from research, several steps are desirable before the process can begin to produce for the market. A small scale plant should be built and operated successfully in order to obtain the engineering data necessary for the design of the full scale plant. The nucleus of a sales force must evaluate the product of the plant and determine in what manner it can best be marketed. All of this requires what has been aptly described as 'patient money' for its successful completion."

Rock Wool

Mineral Insulation Co., Chicago Ridge, Ill., is just completing a plant to make mineral wool from blast furnace slag. Eventually it is expected to make the product from natural rock mixtures. Orval White is president.



Rock Phosphate

Columbia, Tenn.: Unseasonal cold weather has caused the use of fertilizer to be much less than it otherwise would have been, but, even so, a great improvement is reported in the consumption during the season just closed, over that of recent years.

The Ruhm Phosphate and Chemical Co. has announced the discontinuance of its office in Chicago and the reopening of its principal office in the Wheeler building, Mt. Pleasant, as of June 1. John Ruhm, Jr., president, who has been in Chicago for the past three and a half years, has returned to Mt. Pleasant.

The market for all grades of phosphate rock is firmer, and anticipation of decided increases in prices may be the explanation

for considerable volume of inquiries reported as recently received.

Every previous depression has been succeeded by a period of rapidly advancing prices, largely due to the reduction to a minimum of available labor, because during the depression all the workers that can get away drift into other work elsewhere and any increase in demand causes competition for labor among mining companies, when the NRA wages very quickly look as insignificant as they now seem high.

What will follow the present situation from which the country generally appears to be merging, and from which even the phosphate industry must finally emerge, remains to be seen, but with the recent advance in Florida prices and the prospect of freight reductions from Tennessee, it is quite likely that we may see a renewed demand here and the early buyers will in that case reap big rewards.

Considerable interest is being manifested locally in the large plant which is being erected at the establishment of one of the largest of the fertilizer manufacturing mining companies near Mt. Pleasant, on which several people from Florida and other places are here at work, and about which the utmost secrecy is being maintained in every respect.

The outward and visible signs comprise a large building in which one or more very long cylindrical kilns or dryers, evidently to be lined with refractory brick, are being installed, and the general report is that the process to be used is to remove the fluorine from phosphatic limestone for feeding purposes. As any heat that would drive off the fluorine would ordinarily make quicklime of the limestone and ruin it for feeding purposes, it is apparent that this process must either be something entirely novel and unheard of, or else the rumored purpose is incorrect.

At any rate, the actual construction under way is of noteworthy appearance, and whatever is to be done to justify it, it is most gratifying evidence of the new interest in the phosphate business that is manifesting itself from so many directions.



Lime

Strikes in two lime plants, one in Ohio and one in West Virginia, furnished local newspaper publicity during May.



Chubbuck Lime Co., Amboy, Calif., is rebuilding its plant, which was damaged by a recent fire.



Pyrophyllite

Standard Mineral Co., Hemp, N. C. (subsidiary of R. T. Vanderbilt Co., New York City), is building a grinding plant to produce 100 tons daily of pyrophyllite (a mineral similar to talc, largely used for making slate pencils).

RECENT QUOTATIONS ON ROCK PRODUCTS SECURITIES

Stock	Date	Bid	Asked
Allentown P. C., com. ⁴⁷	5-24-35	3	5
Allentown P. C., pfd. ⁴⁷	5-24-35	4	6
Alpha P. C., com.	5-17-35	18½	18½
Amalgamated Phon. 6's, 1936 ⁴⁷	5-24-35	100	102
American Aggregates, com. ⁴⁸	5-16-35	¾	1¾
American Aggregates, pfd. ⁴⁸	5-16-35	3	6
American Aggregates, 6's 1st mtg. 3/6's, 1948, new bonds ⁴⁸	5-16-35	35	....
American Aggregates, 6's, 1943, old bonds ⁴⁸	5-16-35	35	....
American L. and S., 1st 7's ⁴⁸	5-16-35	98	....
Arundel Corp., com. ⁴⁸	5-16-35	17	19
Ashgrove L. & P. C., com. ⁴⁹	5-17-35	9	....
Ashgrove L. & P. C., pfd. ⁴⁹	5-17-35	94

RECENT QUOTATIONS ON ROCK PRODUCTS SECURITIES

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Allentown P. C., com. ⁴⁷	5-24-35	3	5	
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American L. and S., 1st 7's ⁴⁸	5-16-35	98	
Arundel Corp., com. ⁴⁸	5-16-35	17	19	
Ashgrove L. & P. C., com. ⁴⁹	5-17-35	9	
Ashgrove L. & P. C., pfd. ⁴⁹	5-17-35	94	....
Bessemer L. and C., Class A ⁴⁷	5-24-35	3	4	
Bessemer L. and C., 1st 6½'s, 1947 ⁴⁸	5-16-35	33F	....
Bessemer L. and C., cert. of dep., 1947 ⁴⁶	5-18-35	42	45	
Bloomington Limestone, 6's ⁴⁷	5-24-35	8	11	
Boston S. and G., new, com. ³⁷	5-16-35	1½	2½	
Boston S. and G., 7%, pfd. ³⁷	5-16-35	6	8	
Boston S. and G., new, 7's, 1939 ³⁷	5-16-35	70	....
Calaveras Cement, com. ⁴⁰	5-13-35	¾	1	
Calaveras Cement, 7% pfd. ⁴⁰	5-13-35	33	....
California Art Tile, A ⁰	5-13-35	1½	....
Canada Cement, com. ⁴²	5-20-35	6¾	7½	
Canada Cement, pf1 ⁴²	5-20-35	56	60	
Canada Cement, 5½'s, 1947 ⁴²	5-20-35	103	103½	
Canada Crushed Stone, bonds ⁴²	5-20-35	80	85	
Certainsteel Products, com.	5-17-35	4½	4¾	
Certainsteel Products, pfd.	5-17-35	29	29½	
Certainsteel Products, 5½'s, 1948	5-17-35	74	76½	
Consol. Cement, 1st 6½'s, 1941 ⁴⁷	5-24-35	30	32	
Consol. Cement, pfd. ⁴⁷	5-24-35	2	3	
Consol. Oka S. and G. (Can.), 6½'s ⁴²	5-20-35	20	25	
Consol. S. and G., pfd. ⁴²	5-20-35	25	30	
Consol. Rock Products, com. ⁴⁷	5-24-35	1	2	
Consol. Rock Products, pfd. ⁴⁷	5-24-35	2	2	
Consol. Rock Products, units ⁴⁷	5-24-35	3	5	
Construction Mat., com. ⁴⁷	5-24-35	1	2	
Construction Mat., pfd. ⁴⁷	5-24-35	2	3	
Consumers Rock & Gravel, 1st mtg. 6½'s, 1948 ⁴⁷	5-24-35	22	25	
Coose P. C., 1st 6's ⁴⁷	5-24-35	20	25	
Coplay Cement Mfg., pfd. ⁴⁷	5-24-35	10	15	
Coplay Cement Mfg., 6's, 1941 ⁴⁷	5-24-35	72	76	
Cumberland P. C., 7's, 1937 ⁴⁷	5-24-35	85	90	
Dewey P. C., com. ⁴⁷	5-24-35	30	35	
Dolese and Shepard, 5-20-35	13	15		
Dufferin Pav. and Cr. Stone, com. ⁴²	5-20-35	2½	3½	
Dufferin Pav. and Cr. Stone, pfd. ⁴²	5-20-35	25	28	
Federal P. C., 6½'s, 1941 ⁴⁷	5-24-35	20	25	
Fla. Port. Cement, 6½'s, 1937 ⁴⁶	5-18-35	98½	100	
Fla. Port. Cement, units ⁴⁷	5-24-35	25	27	
Giant P. C., com. ⁴⁷	5-24-35	2	4	
Giant P. C., pfd. ⁴⁷	5-24-35	15	17	
Gyp. Lime & Alabastine, Ltd., 5½'s, 1948 ⁴⁷	5-17-35	5½	6	
Hawkeye P. C., cap. ⁴⁹	5-17-35	27½	....
Hercules Cement, com. ⁴⁹	5-17-35	18	....
Hercules Cement, 7% pfd. ⁴⁹	5-17-35	75	....
Hermitage Cement, com. ⁴⁷	5-24-35	12	15	
Hermitage Cement, 1fo. ⁴⁷	5-24-35	60	70	
Ideal Cement, 5's, 1943 ⁴⁷	5-24-35	100	102	
Ideal Cement, com. ⁴⁷	5-24-35	35	37	
Indiana Limestone 6's ⁴⁷	5-24-35	8	11	
International Cement bonds, 5's, 1948	5-18-35	103½	actual sale	
International Cement, com....	5-17-35	29½	2½%	.25 (qu.) June 28
Kelley Island L. and T....	5-25-35	15	actual sale	
Ky. Cons. Stone, 6½'s, 1935 ⁴⁷	5-24-35	15	20	
Ky. Cons. Stone, com. ⁴⁷	5-24-35	1	2	
Ky. Cons. Stone, pfd. ⁴⁷	5-24-35	2	3	
Ky. Cons. Stone, 1st mtg. 6½'s ⁴⁶	5-18-35	15	20	
Ky. Rock Asphalt, com. ⁴⁶	5-18-35	¾	% nom'n'l	
Ky. Rock Asphalt, pfd. ⁴⁶	5-18-35	1	2 nominal	
Ky. Rock Asphalt, 6½'s, 1935 ⁴⁷	5-24-35	25	30	
Lawrence P. C., 5-17-35	16½	18		
Lawrence P. C., 5½'s, 1942 ⁴⁷	5-24-35	90	95	
Lehigh P. C., com.	5-17-35	15½	15½	
Lehigh P. C., 7% pfd.	5-17-35	98%	100½	.87½ (qu.) July 1
Louisville Cement ⁴⁷	5-24-35	80	85	
Lyman-Richey 1st 6's, 1935 ⁴⁷	5-24-35	20	30	
Marbelite Corp., com. (cement pts.) ⁴⁰	5-13-35	3½ c	45c	
Marbelite Corp., pfd. ⁴⁰	5-13-35	4	....
Marblehead Lime, 6's, 1939 ⁴⁴	5-15-35	50	....
Marquette Cement, com. ⁴⁷	5-24-35	21	22	
Marquette Cement, pfd. ⁴⁷	5-24-35	90	95	
Marquette Cement Mfg. 1st 5's, 1936 ⁴⁷	5-24-35	100	102	
Marquette Cement Mfg. 1st 6's, 1935 ⁴⁶	5-18-35	100½	....
Material Service Corp. ⁴⁷	5-24-35	1	3	
McCrady-Rodgers, com. ⁴⁷	5-24-35	6	8	
McCrady-Rodgers, 7% pfd. ⁴⁷	5-24-35	30	35	
Medusa P. C., com. ⁴⁷	5-24-35	14	18	
Medusa P. C., pfd. ⁴⁷	5-24-35	45	50	
Michigan L. and C., com. ⁴⁷	5-24-35	60	65	
Missouri P. C., 7's ⁴²	5-17-35	7½	8½	
Monarch Cement, com. ⁴⁷	5-24-35	70	80	
Monolith P. C., com. ⁹	5-13-35	4	4½	
Monolith P. C., 8% pfd. ⁹	5-13-35	6	6½	
Monolith P. C., units ⁹	5-13-35	12	13	
Monolith P. C., 1st mtg. 6's ⁹	5-13-35	90	101	
Monolith Portland, Midwest ⁹	5-13-35	1½	....
National Cement (Can.), 1st 7's ⁴²	5-20-35	100	103	
National Gypsum A., com. ⁴⁷	5-24-35	9½	10	
National Gypsum, pfd. ⁴⁷	5-24-35	88	91	1.75 (qu.) July 1
National Gypsum, 6's ⁴⁷	5-24-35	101	103	
National L. and S., 6½'s, 1941 ⁴⁷	5-24-35	95	98	
Nazareth Cement, com. ⁴⁷	5-24-35	5	7	
Nazareth Cement, pfd. ⁴⁷	5-24-35	40	45	
Newaygo P. C., 7% cum. pfd. ⁴⁹	5-17-35	24	....
Newaygo P. C., 1st 6½'s, 1938 ⁴⁶	5-18-35	95	....
New England Lime 6's, 1935 ¹⁴	5-15-35	10	....
N. Y. Trap Rock, 1st 6's, 1946....	5-17-35	75%	80½	
N. Y. Trap Rock, 7% pfd. ⁴⁶	5-18-35	50	....
North Amer. Cement, 1st 6½'s, 1953 ⁴⁷	5-24-35	26	28	
North Amer. Cement, 6½'s, 1943 ⁴⁷	5-24-35	88	90	
North Amer. Cement, 6½'s, 1940 ⁴⁷	5-24-35	60	65	
North Amer. Cement, com. ⁴⁷	5-24-35	1	2	
North Amer. Cement, 7% pfd. ⁴⁷	5-24-35	2½	3	
North Shore Mat. 1st 6's ⁴⁷	5-24-35	35	40	
Northwestern Port. Cem., units ⁹	5-13-35	30	42	
Northwestern States P. C. ⁴⁷	5-24-35	24	27	
Ohio River S. and G., com....	5-25-35	1	3	
Ohio River S. and G., 1st pfd....	5-25-35	5½	....
Ohio River S. and G., 2nd pfd....	5-25-35	5	10	
Ohio River S. and G., 6's ⁴⁷	5-18-35	10	12	
Oregon P. C., com. ⁴⁷	5-24-35	2	4	
Oregon P. C., pfd. ⁴⁷	5-24-35	65	70	
Pacific Coast Agg., new com. ⁴⁰	5-13-35	1¼	1½	
Pacific Coast Cement 6's, 1937....	Called			
Pacific P. C., com. ⁴⁰	5-13-35	2½	3	
Pacific P. C., pfd. ⁴⁰	5-13-35	24	37	
Peerless Cement, com.	5-24-35	½	1	
Peerless Cement, pfd.	5-24-35	4	5	
Penn.-Dixie Cement, com.	5-17-35	4¾	4½	
Penn.-Dixie Cement, pfd.	5-17-35	24	24½	
Penn.-Dixie Cement, 6's A, 1941....	5-17-35	86½	88½	
Penn. Glass Sand Corp., pfd. ⁴⁷	5-24-35	88	91	
Penn. Glass Sand Corp., 6's ⁴⁷	5-24-35	105	107	
Petroskey P. C., 6's, 1935-38 ⁴⁸	5-16-35	95	....
Petroskey P. C., com. ⁴⁸	5-16-35	2½	....
Republic P. C., 6's, 1943 ⁴⁷	5-24-35	85	88	
Riverside Cement, A ⁰	5-13-35	7½	8½	
Riverside Cement, B ⁰	5-13-35	¾	1¼	
Riverside Cement, pfd. ⁰	5-13-35	92½	95	1.50 (qu.) May 1
Rockland and Rockport Lime, 1st pfd. ⁴⁷	5-24-35	2	3	
Sandusky Cement, 6½'s ⁴⁷	5-24-35	100	103	
Santa Cruz P. C., com. ⁹	5-13-35	40	50	
Schumacher Wallboard, com.*....	5-13-35	1	1½	
Schumacher Wallboard, pfd.*....	5-13-35	4	4½	
Signal Mt. P. C., units ⁴⁷	5-24-35	32	35	
Southwestern P. C., units ⁴⁷	5-13-35	190	....
Spokane P. C., units ⁴⁷	5-17-35	8	....
Standard Paving & Mat. (Can.), com. ⁴²	5-20-35	¾	1	
Standard Paving & Mat., pfd. ⁴²	5-20-35	10	15	
Superior P. C., A ⁴⁰	5-13-35	32	35	.27½ (accum.) May 1*
Superior P. C., B ⁴⁰	5-13-35	5½	7½	
Trinity P. C., units ⁴⁷	5-24-35	10	15	
U. S. Gypsum, com....	5-17-35	52	54	.25 (qu.) July 1
U. S. Gypsum, pfd....	5-17-35	15½	157	1.75 (qu.) July 1
Volunteer P. C., 1st 7's, 1942 ⁴⁸	5-17-35	64	....
Volunteer P. C., com. ⁴⁹	5-17-35	17½	....
Vulcanite P. C., com. ⁴⁹	5-17-35	1½	
Vulcanite P. C., 7½'s, 1943 ⁴⁸	5-17-35	44	

Rock Products

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Recent Dividends Announced

U. S. Gypsum, com.	
(quar.)	\$0.25, July 1, 1935
U. S. Gypsum, pfd.	
(quar.)	1.75, July 1, 1935
International Cement,	
com. (quar.)	.25, June 28, 1935
Lehigh Portland Ce-	
ment Co., pfd.	
(quar.)	.87½, July 1, 1935
National Gypsum, 7%	
pfd. (quar.)	1.75, July 1, 1935
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Lehigh Portland Cement Co., Allentown, Penn., reports for the 12 months ended March 31, 1935, net profit of \$663,590 after taxes, depreciation, depletion and obsolescence, equal to \$4.46 a share on 148,854 shares (par \$100) of 7% preferred, against net loss of \$434,407 in the 12 months ended March 31, 1934. For the calendar year ended December 31, 1934, the company reported current assets, including \$10,113,125 cash, U. S. Government and other marketable securities, at market quotations, amounted to \$13,547,646 and current liabilities were \$680,940. This compares with cash, U. S. Government and other marketable securities, of \$8,450,286, current assets of \$11,802,908 and current liabilities of \$522,168 at end of preceding year.

Income account for year 1934 compares as follows:

	1934	1933
Sales	\$9,492,264	\$6,455,916
Costs, expenses, etc.	7,189,534	5,780,995
Balance	\$2,302,730	\$ 674,921
Other income	377,500	298,522
Total income	\$2,680,230	\$ 973,443
Depreciation, depletion, etc.	1,726,075	1,606,863
Provision to reduce investment		141,000
Provision for federal tax	105,000	
Provision for loss of sub.		73,000
Net profit	\$ 849,155	\$ 847,420
Preferred dividends	534,743	556,633
Surplus	\$ 314,412	\$ 1,404,053

*Loss. †Deficit.

Preferred dividends in arrears at the close of the year were \$7.87½ per share.

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Warner Co., Philadelphia, Penn., reports for the years ended December 31:

	1934	†1933
Net sales	\$2,737,684	\$2,368,556
Cost of sales	1,997,259	1,899,647
Depreciation and depletion	521,977	*987,031
Selling expense	120,443	129,683
Administration and general expense	137,519	165,358
Provision for bad debts	26,939	43,788
Discount allowed	98,783	103,310
Operating loss	165,236	960,261
Interest, dividends, etc., receivable	14,090	10,886
Discount earned	37,431	35,141
Loss	113,715	914,234
Bond and other interest	402,871	410,741
Amortization	36,882	37,030
Miscellaneous deductions	182	107
Net loss	\$553,650	1,362,112
Earned per share, common	(d)\$4.09	(d)\$8.53

*Includes \$439,675 of depreciation charged by company to "other income deductions" rather than to costs.

†Reflects changes arising from declaring operative the readjustment plan dated May 4, 1932.

‡Before crediting \$21,181 profit from sales of investments and other property, etc., and \$17,738 discount on treasury bonds retired, and debiting \$2,488 discount and expense on bonds retired.

Note: Statements for 1934 and 1933 do not take into account estimated net profit of controlled companies not consolidated, which amounted to approximately \$13,000 and \$30,-00 respectively.

Current assets as of December 31, 1934, were \$1,379,850 and current liabilities \$144,284. Cash assets were \$682,716.

In his report to stockholders, Charles Warner, president, said:

The year 1934 shows an increase in net sales of 15.6% over the preceding year. This moderate improvement, amounting to \$369,000, was accompanied by a decrease in loss after all charges, including depreciation and depletion but before interest, ground rents, and amortization of bond discount, amounting to \$360,000. This change to a slight upward trend is in general accord with the moderate improvement noted in some of the durable goods industries. The year's operations were conducted at an average rate of about 25% of the capacity of facilities.

The year 1934 also showed a substantial gain in working capital by an amount approximating \$240,000, which is comparable with a loss in working capital for the preceding year of about \$220,000.

In addition to its main operations, your company owns the control of two subsidiary corporations: the American Lime & Stone Co. of Bellefonte, Penn., engaged mainly in the manufacture of special grades of chemical and industrial limes; and the King Farms Co. of Morrisville, Penn., engaged in extensive truck farming on a portion of the Warner Co.'s sand and gravel reserve lands. For 1934 the net sales of the American company amounted to \$878,000, compared with \$715,000 in 1933, an increase of 23%. The King Farms Co. for its fiscal year ending February 28, 1935, showed sales of crops amounting to \$478,000, compared with \$390,000 for the preceding year, an increase of 22.6%.

It is a recognized fact that, as a result of the extremely subnormal construction level existing in the past five years, there is accumulating a large volume of construction needs in many classes of work. While this potential demand must in time assert itself, it is also apparent that political uncertainties in our country are retarding the return of confidence necessary to justify long-term private-capital investment. How long this situation will continue is uncertain, but until it clears we cannot expect to experience a return to normal conditions, with an adequate construction program undertaken by private capital and with the normal reemployment of idle labor.

We also face a period of increasing taxes in many directions, which in general, however, can usually be provided for by advances in market prices of commodities.

Due to the efforts of the federal government and political subdivisions partially to span this period of subnormal construction by appropriations for public works, we expect a further small improvement in volume for 1935 as compared with the past year. When the interference of government with private business is minimized and stabilized on some reasonable relationship that imparts confidence to those undertaking long-term investments, we may then expect the real forward drive in recovery of the durable goods industries. Each year that this stabilizing is delayed unquestionably increases the potential volume of future construction work.

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Republic Portland Cement Co., San Antonio, Tex., reports a balance sheet for the year ended December 31, 1934, showing current assets of \$447,043 and current liabilities of \$46,112, compared with \$328,453 and \$20,894, respectively, for the previous calendar year. Cash assets were \$256,476 on December 31, 1934, as against \$155,242 the year preceding.

National Gypsum Co., Buffalo, N. Y., reports for the years ended December 31:

	1934	1933
Gross income	\$447,778	\$404,610
Depreciation and depletion	71,715	68,359
Operating income	376,063	336,251
Interest	26,366	28,500
Federal income tax	39,000	35,000
Other income (net)	10,843	
Net income	321,541	272,751
Preferred dividends	179,827	179,083
Surplus for year	141,713	*93,668
Earned per share, common		A \$1.09 \$0.72

*Before debiting \$11,935 cancellation of premiums on cancelled stock subscriptions.

Balance sheet as of December 31, 1934, showed current assets of \$1,362,710 and current liabilities of \$191,864.

In his report to stockholders, M. H. Baker, president, said:

Building contracts for the year totaled only 19% of 1929. As a result, industry sales were very low for each of our products. Increased volume for our company was obtained through the sale of additional products and by securing a number of new accounts.

In addition to enlarging our distribution, considerable investment was made in new equipment designed to improve quality and reduce costs, in the extension of research activities, and for the manufacture of new products.

Special regrinding mills have been installed at our gypsum plants for processing plaster. The result is a better working, stronger plaster with definite appeal to plasterer and consumer. As building increases we look to this improved plaster for substantial growth in tonnage.

Following our policy of constant product development, our research engineers have devised during the past two years a practical method of laminating extremely thin pure aluminum foil to gypsum board. The insulation resulting is more effective than fiber board used for the same purpose. Special machines have been designed and built to manufacture this latest type insulation at low cost. Its sale has already developed into attractive volume.

Though our principal interest is in gypsum, the management has recognized the value of developing a group of related wall and ceiling products. The purpose is to build volume in all territories and thus to justify closer service to our accounts through greater field representation. As a result of this policy our company now competes aggressively in six major industries — wallboard, plaster, lime, metal lath, insulation and acoustics.

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Coronet Phosphate Co. (Florida pebble rock producer), New York City, reports for the years ended December 31:

	INCOME ACCOUNT	1934	1933
Gross revenue	\$645,553	\$442,604	
Operating expenses, etc.	417,513	297,934	
Depreciation and depletion	107,089	111,325	
Operating income	120,951	33,345	
Federal income tax	16,655		
Research, etc., expenses		2,965	
Net income	104,296	30,380	
Dividends	162,500	125,000	
Deficit for year	58,204	94,620	
Surplus, January 1	299,557	451,473	
Loss on property sold		57,296	
Surplus, December 31	241,353	299,557	
Earned per share	\$4.17	\$1.22	
Number of shares, 25,000			

The balance sheet as of December 31, 1934, showed current assets of \$831,329 and current liabilities of \$69,527; working capital \$761,802. A dividend of \$1.50 per share was paid January 2, 1935.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of May 18:

New England

33641. To establish following storage charges on **foundry sand**, in bags, stored on piers at Boston (Hoosac Wharves or Mystic Wharf), Mass. (per ton of 2000 lb.): For first month or part thereof, \$1.05; for each succeeding month or part thereof, 25c.

33683. To cancel rate of 90c per net ton on **stone**, broken or crushed, other than coated, in bulk, in gondola or other open top cars, from Westfield, Mass., to Millerton, N. Y., as published in N. Y. N. H. & H. R. R. I. C. C. F33323, and in lieu thereof apply mileage scale as published in the same tariff.

Trunk

33466 (Sup. 2). **Sand, building, glass, engine, moulding, ground flint, quartz and silex**, in straight or mixed carloads (See Note 2), from Hancock and Round Top, Md., to Albany, N. Y., \$3.10 per net ton.

Sup. 1 to 33484. **Slag** (product of iron or steel or open hearth furnaces), not ground or pulverized, and **stone**, crushed, coated with tar, oil and/or asphaltum, or similar bituminous material, in bulk, in open top equipment, C. L. (See Note 2), from Bethlehem, Penn., to Erie R. R. stations, Jersey City Local, Passaic, N. J., Tallmans, Arden, Newburgh, Port Jervis, N. Y., Lackawaxen, Scranton, Penn., Stockport, N. Y., Great Bend, Penn., Binghamton, Owego, Elmira, N. Y., Edgewater, Franklin, N. J., Stroudsburg, Clifton, Dickson, Penn., Hackensack, N. J., Spring Valley, N. Y., Ridgefield, N. J., Nyack, N. Y., and various, rates ranging from \$1.23 to \$1.81 per net ton.

33528. To establish commodity rates on **slate, crushed or ground**, C. L., minimum weight 50,000 lb., from Muncy, Penn., to Central Freight Association on same basis as is now in effect from Albany, Lenhartsville and Virginville, Penn.

33530. **Stone, natural, viz., crushed, coated with oil, tar or asphaltum**, C. L. (See Note 2), from Martinsburg, W. Va., to B. & O. R. R. stations Wheeling, Moundsville, Sisterville, Waverly, Meyercord, W. Va., and various, rates ranging from \$1.83 to \$1.90 per net ton.

33532. **Lime**, C. L., minimum weight 30,000 lb., and **pulverized limestone**, C. L., minimum weight 50,000 lb., from Swatara, Penn., to Cornwall, Ont., 29c per 100 lb.

33557. **Slag** (product of iron or steel or open hearth furnaces), not ground or pulverized, coated with tar, oil and/or asphaltum, or similar bituminous material, in bulk, in open top cars, C. L.; **stone**, crushed, coated with oil, tar and/or asphaltum, or similar bituminous material, in bulk, in open top cars, C. L. Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading. (See Note 2), from Bethlehem, Penn., to stations on the L. V. R. R., rates ranging from 93c to \$1.81 per net ton, subject to emergency charge.

33559. To cancel various commodity rates on **crushed, rough and broken stone**; also **stone chips and granules (roofing granules)**, C. L., from Baltimore, Deerfield, Flint, Sabillasville and Union Bridge, Md., Fairfield, Friend, Maria Furnace and State Line, Penn., Bemis, Coffman and Thomas, W. Va., to destinations as indicated in the miscellaneous section, W. M. Ry. I. C. C. 8070.

33563. **Slag**, C. L. (See Note 2), from Nichols Siding, N. Y., to Rochester, N. Y., \$3 per net ton, subject to emergency charge.

33570. **Common sand**, other than blast, engine, foundry, glass, moulding, silex or silica, in open top equipment, C. L., and/or **crushed stone**, C. L. (See Note 2), from Hopatcong Junction, N. J., to Camden, N. J., \$1.40 per net ton, subject to emergency charge.

33572. **Crude fluxing limestone**, C. L. (See Note 2), from Pleasant Gap, Penn., to Weatherly, Penn., \$1.76 per gross ton, subject to emergency charge.

33573. **Sand, blast, engine, fire, foundry, glass, moulding, quartz, silex and silica**, in straight or mixed carloads (See Note 2), from Morrisville and Tullytown, Penn., to Tatamy, Penn., \$1.62 per net ton, subject to emergency charge.

33575. To cancel rates on **slate, crushed or ground**, C. L., also **stone chips or granules**, C. L. (See Note 2), as published in C. & O. Ry. Freight Tariff 327-J, I. C. C. No. 11764, Items Nos. 105 and 1035, from Norwood, Va., to Trunk Line destinations.

33576. **Slag** (product of iron or steel or open hearth furnaces), not ground or pulverized, coated with tar, oil and/or asphaltum, or similar bituminous material, in bulk, in open top cars, C. L.; **stone**, crushed, coated with oil, tar and/or asphaltum, or similar bituminous material, in bulk, in open top cars, C. L. Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading (See Note 2), from Bethlehem, Penn., to Staten Island Rapid Transit Ry. stations, rates ranging from \$1.33 to \$1.43 per net ton.

33584. **Limestone, crude, fluxing, foundry and furnace**, when shipped in open top equipment (See Note 2), from Stephens City, Va., to Bridgeville, Penn., \$1.26 per gross ton, subject to emergency charge.

33588. **Sand**, C. L. (See Note 2), to Sherbrooke, Que., from Cedarville, Dividing Creek, Mauricetown and Newport, N. J., 26½c, and from Pinewald, N. J., 24c per 100 lb., subject to emergency charge.

33593. **Gravel**, C. L. (See Note 2), from Williamsport to Newberry, Penn., to McConnellsburg to Saxton, Penn., \$1.40, and to Coalmont to Everett, Penn., \$1.50 per net ton, subject to emergency charges.

33596. **Slag** (product of iron or steel or open hearth furnaces), not ground or pulverized, coated with tar, oil and/or asphaltum, or similar bituminous material, in bulk, in open equipment, C. L.; **stone**, crushed, coated with tar, oil and/or asphaltum, or similar bituminous material, in bulk, in open equipment (See Note 2), from Bethlehem, Penn., to W. Md. Ry. stations, Baltimore stations, Asbestos, Keymar, Edgemont, Md., Shippensburg, Penn., Cherry Run, W. Va., Intersection, Hanover, Berlin Junction, Advance, Penn., and various, rates ranging from \$1.63 to \$1.81 per net ton.

Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading.

33597. **Stone, natural (other than bituminous asphalt rock)**, crushed, coated with oil, tar or asphaltum, C. L. (See Note 2) Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity as shipped, the shipper to so certify on bills of lading and shipping orders, from Mill Hall, Penn., to Renova, Penn., \$1.08 per net ton, subject to emergency charge.

33599. **Ground sand**, C. L. (See Note 2), from Newark, N. J., to Valentines, N. J., \$1.40 per net ton, subject to emergency charge and subject to whatever revision is established under the industrial sand case.

33600. **Slate, dust**, crushed and ground, in packages or in bulk, in carloads, minimum weight 50,000 lb., from Fair Haven, Vt., to Castleton, Vt., inclusive, Poultney, Vt., to West Pawlet, Vt., inclusive, to Llanerch, Penn., 17c per 100 lb., subject to emergency charge.

33603. **Stone, natural (other than bituminous asphalt rock)**, crushed, C. L. (See Note 2), from Prospect Junction, N. Y., to Tribes Hill, Fonda, N. Y., \$1; Palatine Bridge, Port Plain, St. Johnsbury, N. Y., 91c; Little Falls, N. Y., 83c; Inghams, Dolgeville, N. Y., \$1.03, and Salisbury Center, N. Y., \$1.13 per net ton, subject to emergency charges.

33614. **Common sand**, in open equipment, C. L. (See Note 2), from Beach Glen, N. J.,

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

to points on the C. R. R. of N. J., Ironon, R. R., D. L. & W. R. R., L. & N. E. R. R., L. V. R. R., N. & B. R. R., and Reading Co., Northampton, Hercules, Nazareth, Bath, Coplay, Navarro, Evansville, West Conshohocken, Penn., and various, rates ranging from \$1 to \$1.40 per net ton.

33618. **Crushed or ground slate, also slate dust**, C. L., minimum weight, 50,000 lb., from Whiteford and Cardiff, Md., Delta and Slate Hill, Penn., to Metuchen, N. J., 16½c per 100 lb., subject to emergency charge.

Sup. 1 to 33584. **Limestone, crude, fluxing, foundry and furnace**, when shipped in open top equipment (See Note 2), from Thomasville, Penn., to Bridgeville, Penn., \$1.26 per gross ton.

33623. **Broken stone**, as shown in Item 10 of P. R. R. Tariff I. C. C. 1387 from Billmeyer and Union Stone Co., Penn., to Camp Hill, Penn., Williamson, Md., Loretto, Md., Olney, Cobbs and Portsmouth, Va., and various points on the P. R. R., rates ranging from \$1 to \$2.20 per net ton. Subject to emergency charge.

Central

42481. To amend Item 150 of C. F. A. L. Exceptions Tariff 130W on mixed carloads of **building lime** and/or **agricultural chemical and land lime** and/or **unburnt ground or pulverized limestone**, from points in C. F. A. territory to points in T. L. A. territory, by providing that said rates will not apply thereon for movements to or through the state of New York.

42823. To establish on **stone, crushed, slag and/or gravel**, coated with oil, tar or asphaltum, in open top equipment, C. L., from Canton, O., to all stations in Ohio for intra-state movement, 38% of sixth class. Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity as shipped the shipper to so certify on shipping order and bill of lading.

42826. To establish on **stone, curbing**, C. L., minimum weight 50,000 lb., from Amherst, O., to Detroit, Mich., 10c.

42840. To establish on **stone, crushed**, in bulk, in open top cars, **limestone**, agricultural, unburned, in bulk in open top cars, limestone, agricultural (not ground or pulverized, in bulk in open top cars, C. L. (Rates in cents per net ton.)

To	From
N. & W. Ry. Stas.	Marion, Owens, Carey.
Anawalt, W. Va.	Ohio
Leager, W. Va.	Ohio
Superior, W. Va.	Ohio
Buffalo Creek, W. Va.	Ohio
Hewlet, W. Va.	Ohio
Wayne, W. Va.	Ohio
Crum, W. Va.	Ohio
Kermitt, W. Va.	Ohio
Naugatuck, W. Va.	Ohio
Panther, W. Va.	Ohio
Welch, W. Va.	Ohio

42841. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) or **gravel**, in open top cars, C. L. from Conesville, O. (Rates in cents per net ton.)

To	Prop.
Zanesville, O.	50
Ellis, O.	40
Coshocton, O.	40
Baltic, O.	50
Dundee, O.	60
Beach City, O.	80
Scio, O.	85
Rexford, O.	90
Adena, O.	95
Short Creek No. 1 Mine, O.	100
Robyville, O.	95
St. Clairsville, O.	100
Neffs, O.	105
Warrenton, O.	100
Yorkville, O.	100
Martins Ferry, O.	105
Wheeling, W. Va.	105
Benwood, W. Va.	105
Bridgeport, O.	105
Bellaire, O.	105
Steubenville, O.	100
Kimbolton, O.	80

42898. To establish on **sand** (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica), and **gravel**, in open top cars, C. L., from New Philadelphia, O., to Tippecanoe, O., 50c per net ton.

42902. To establish on **sand**, except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica, and **gravel**, in straight or mixed carloads, from Randles, O., to Kimbolton,

Rock Products

59

O., 60c per net ton. Route—Via P. R. R. direct.

42903. To establish on **gravel and sand**, except blast, core, engine, fire or furnace, foundry, filter, glass, grinding or polishing loam, moulding or silica, in straight or mixed carloads, from Ashtabula, O., to Colonial Colliery No. 3, Penn., 140c per net ton. (Emergency charge in addition to proposed rate.)

42907. To establish on **stone**, crushed, coated with oil, tar or asphaltum, C. L., from Erie, Penn. Rates in cents per net ton:

To *Proposed

Columbus, Penn.	108
Lottsville, Penn.	108
Bear Lake, Penn.	108
Niobe, N. Y.	108
Watts Flats, N. Y.	108
Ashville, N. Y.	108
Lakewood, N. Y.	118
Jamestown, N. Y.	118
Falconer, N. Y.	118
Kennedy, N. Y.	118
Waterboro, N. Y.	118
Randolph, N. Y.	128
Steamburg, N. Y.	128

*Emergency charge in addition to proposed rates where authorized.

42908. To establish on **slag**, crushed, coated with oil, tar or asphaltum, C. L., from Canton, O., to various P. R. R. points, representative of which are as follows. Rates in cents per net ton:

To Proposed

Pittsburgh, Penn.	123
Leetonia, O.	83
Massillon, O.	73
Mansfield, O.	103
Bridgeport, O.	113
Wheeling, W. Va.	113
Cleveland, O.	103
Ellwood Jct., Penn.	103
Youngstown, O.	93
New Castle, Penn.	103
Erie, Penn.	143
Toledo, O.	143
Sandusky, O.	133
Akron, O.	83
Zanesville, O.	123
Carnegie, Penn.	123
Washington, Penn.	123
Weirton Jct., W. Va.	103
Beech Bottom, W. Va.	113
Steubenville, O.	103
Newark, O.	123

Emergency charge in addition to proposed rates where authorized.

42909. To establish on **gypsum rock**, crushed (not ground), or run of mine, C. L., from Grand Rapids and Grandville, Mich., to Mt. Vernon, O., 260c and Clarksburg, W. Va., 320c per net ton, subject to the emergency charge.

42923. To establish on **stone**, crushed, and **stone screenings**, in bulk, in open top cars, C. L., from Marble Cliff, O., to Midkiff, W. Va., 170c per net ton. (Emergency charge in addition to proposed rate). Route: Via P. R. R., Columbus, O., C. & O. Ry.

42924. To establish on **agricultural limestone**, C. L., minimum weight 60,000 lb., from Maple Grove, O., to Hartford, Mich., 165c per net ton. (Emergency charge in addition to proposed rate). Route: Via P. R. R., Toledo, O., P. M. Ry.

42925. To establish on (a) **agricultural limestone**, unburnt, in bulk, in open top cars, C. L., and (b) **agricultural limestone**, unburnt, in box cars, C. L., minimum weight 60,000 lb., from Ridgeville, Ind., to Columbus, O., (a) 100c, and (b) 140c per net ton. (Emergency charge in addition to proposed rate). Route: Via P. R. R. direct.

42926. To establish on **fluxing stone**, furnace and/or foundry, melting and/or refractory (unburnt), in bulk, in box cars, C. L., from Ridgeville, Ind., to Lancaster, O., 200c per gross ton. (Emergency charge in addition to proposed rate). Route: Via P. R. R. direct.

42929. To establish on **slag**, coated with oil, tar or asphaltum (see note), in open top cars, C. L. Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading, from Canton, O., to points in Ohio, Pennsylvania and West Virginia, representative of which are as follows, rates in cents per net ton: To Akron, O., 83; Grafton, O., 103; Willard, O., 113; Sandusky, O., 133; Massillon, O., 93; St. Clairsville, O., 133; Barnesville, O., 143; Zanesville, O., 161; Petrolia, Penn., 133; Mars, Penn., 123; Pittsburgh, Bessemer, Bruceton, Penn., 143; Tylerdale, Penn., 153; Wheeling, W. Va., 133; Mountaine, W. Va., 143; Sistersville, W. Va., 153; Parkersburg, W. Va., 168, being proposed rates. Route: Via B. & O. R. R.

42953. To establish on **sand**, except blast, core, engine, filter, fire or furnace, foundry,

glass, grinding or polishing loam, moulding and silica, or **gravel and crushed stone**, in bulk, in open top cars, C. L., from Kenneth, Ind., to South Bend, Ind., 70c per net ton. Route: Via P. R. R. direct.

42955. To establish on **stone**, crushed, coated with oil, tar and/or asphaltum, in open top equipment, C. L., from Erie, Penn., to Erie R. R. stations, viz.: Cambridge Springs, Cochranton, 103c; Franklin, 113c; Millers, 103c; Mill Village, 108c; Oil City, 113c; Saegertown and Utica, Penn., 103c per net ton. (Emergency charges provided in B. T. Jones' Tariff I. C. C. 2795 will apply if and when approved.) Routing: Via B. & L. E. R. R., Meadville, Penn., and Erie R. R.

42956. To cancel rates on **sand**, viz., blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing loam, moulding and silica, from Conneautville and Dicksonburg, Penn., to points in Canada, Illinois, Indiana, Iowa, Kentucky, Michigan, Missouri, New York, Ohio, Pennsylvania, West Virginia and Wisconsin, as published in B. & L. E. R. R. Tariff 942, permitting classification basis to apply.

42957. To establish on **sand and gravel**, C. L., from Munger, Ill., to South Bend, Ind., on C. S. S. & S. B. R. R., 95c per net ton.

42958. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing loam, moulding or silica), and **gravel**, in open top cars, from Black Rock and Buffalo, N. Y., to N. Y. C. R. R. destinations, viz., Athol Springs, Lakeview, Derby, N. Y., 60; Waite's Crossing, N. Y., 70; Dunkirk, Van Buren, Brocton, Portland, Westfield, N. Y., 80; North East, Moorhead, Harbor Creek, Penn., 90; Wesleyville, Swanville, Fairview, Penn., 100; North Girard, Springfield, Penn., Conneaut, O., 110, being proposed rates in cents per net ton.

42976. To establish on **slag**, C. L., from Detroit, Mich., to Hartman, Ind., 140c per net ton, plus emergency charge. Route—Via Wabash Ry. direct.

42977. To establish on **slag** (a product of iron and steel blast or open hearth furnaces), C. L., in open top equipment, from Chicago, Ill., to Indianapolis, Ind., 168c per net ton.

42978. To establish on **stone, crushed**, or **gravel**, coated with oil, tar or asphaltum, in open top cars, C. L., from Martins Ferry, O., to East Liverpool, Salineville, 93c; Bayard, Alliance, Waynesburg, New Comerstown, 103c, and Kimbolton, O., 113c per net ton.

42980. To establish on **sand**, mixed with 10% asphalt, in open top cars, C. L., from Michigan City, Ind., to South Bend, 115c; Gary, Ind., 96c; Chicago, Ill., 119c per net ton, subject to emergency charges.

43016. To establish on **limestone**, crude, fluxing, foundry and furnace, C. L., when shipped in open top equipment. (See Note 3), following rates, subject to emergency charge, from Capon Road, Va., to Butler, Penn., 129c per gross ton; Johnston, Penn., 97c; West Homestead, Penn., 108c, and Toronto, O., 129c.

43018. To establish on **crushed, ground or pulverized limestone**, C. L., from Mosher and Ste. Genevieve, Mo., to Lancaster, O., and Winchester, Ind., rates of 16 1/4c and 15c, respectively, subject to emergency charge.

43019. To establish on **crushed stone**, C. L., from Keepert, Ind., to Hartman and Wabash, Ind., 65c per net ton. Route—Via Wab. Ry. direct.

43022. To establish on **ground cannister rock**, C. L., minimum weight 40,000 lb., from Chicago, Ill., to Muskegon, Mich., 240c per net ton.

43026. To establish on **crushed stone, crushed stone screenings and agricultural limestone** (not ground or pulverized), in bulk, in open top cars, C. L., from Kokomo, Ind., to points in Indiana, viz. (rates in cents per net ton):

To	Prop.	To	Prop.
Middletons	60	Elwood	65
Russiaville	60	Goldsmith	65
Forest	60	Kempton	65
Michigantown	60	Sircleville	65
Avery	65	Hilliard	70
Frankfort	65	Boyleston	70
Jefferson	65	Mulberry	70
Fickle	70	Montmorenci	80
Clark's Hill	70	Otterbein	85
Kirkpatrick	75	Foresmans	85
Linden	75	Templeton	85
Muncie	80	Chase	88
Camack	75	Boswell	88
Gilman	70	Talbot	88
Alexandria	70	Handy	88
Dundee	65	Ambia	88

Route—Via N. C. & St. L. R. R. direct.

43042. To establish on **sand**, common, and **gravel**, C. L., from Navarre, O., to Big Prairie and Lakeville, O., 80c per net ton,

subject to tariff of emergency charges. Route—Via W. & L. E. Ry., Orrville, O., and P. R. R.

43043. To establish on **sand**, common, and **gravel**, C. L., from Conesville, O., to Dover, O., 80c per net ton, subject to tariff of emergency charges.

43050. To establish on **stone**, crushed, **slag** and/or **gravel**, coated with oil, tar or asphaltum, in open top cars, C. L., from Indianapolis, Ind., to Louisville, Ky., 153c per net ton. Route—Via P. R. R. direct.

Note—The oil tar and/or asphaltum not to exceed 10% of weight of the commodity shipped.

43059. To establish on **crushed stone**, C. L., from Glass Rock, Ind., to Jasper and Huntingburg, Ind., 80c per net ton.

43060. To establish on **sand and gravel** (pit waste material), in open top cars only, C. L., (See Note 3), from Dundee, Ind., to Elwood, Ind., 35c per net ton. Route—Via N. Y. C. & St. L. R. R.

43061. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing loam, moulding or silica), or **gravel**, in open top cars, C. L., from Conesville, O., to Pomerene and Walhonding, O., 70c per net ton. Route—Via W. & L. E. Ry., Coshocton, O., and P. R. R.

43070. To establish on **gravel and sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing loam, moulding or silica), in straight or mixed carloads, (See Note 3), from St. Albans, W. Va., to Marting and North Cannelton, W. Va., 100c and 90c per ton, respectively, subject to emergency charges.

Southern

S. F. A. Submittal 7877. To establish on **stone**, natural, viz.: Granite, marble, limestone, sandstone; paving, curbing, flagging and bridge stone.* C. L., minimum weight 50,000 lb., packing and bracing specifications as provided in Southern Classification to be applied, interterritorially, between points in S. F. A. territory, on the one hand, and points in Official territory, including I. F. A. territory, on the other (a) except between Southern Virginia and North Carolina points in Docket 13494 Groups 1 through 4, on the one hand, and points in Buffalo-Pittsburgh, Trunk Line and New England territories, on the other; 12 1/2% of Docket 13494 first class rates and (b) between Southern Virginia and North Carolina points in Docket 13494 Groups 1 through 4, on the one hand, and points in Buffalo-Pittsburgh, Trunk Line and New England territories, on the other; 12 1/2% of constructive first-class rates published in Agent Curlett's Tariff I. C. C. A358. *Note: Rates on bridge stone will apply only on rough chipped bridge pier or bridge abutment granite or marble; and on rough chipped or rough sawed bridge pier or bridge abutment limestone.

8219. **Phosphate rock and phosphatic limestone**, C. L., Aetna, Bon Aqua, Centreville, Columbia, Easton, Harsh Switch, Hohenwald, North Riverside, Towney and Perryville, Tenn., to East Point, Fort McPherson, Hapeville, LaGrange, Lakewood Station, Newnan, Oakland City, Ormewood Station and Union City, Ga. It is proposed to establish rate of \$3.32 and \$3.62 per net ton from Groups 1 and 2, respectively, of N. C. & St. L. Ry.'s I. C. C. 3323-A to above named destinations. The rates proposed from Group 1 are the same as currently in effect from L. & N. R. R. Mt. Pleasant district mines, the proposed rate from Group 2 constructed the usual 30c differential over Group 1.

8258. To establish transit arrangements at Wales, Tenn., whereby **wet phosphate rock**, C. L., minimum weight 120,000 lb., may be shipped from Mt. Pleasant, Tenn., to Wales, Tenn., to be dried, or dried and mixed and/or ground and reshipped via the L. & N. R. R. to subsequent and further destinations, subject to a transit rate of 12 1/2c per ton of 2,000 lb. It is proposed to establish a local rate of 57c per net ton on **wet phosphate rock**, C. L., minimum weight 120,000 lb., from Mt. Pleasant, Tenn., to Wales, Tenn.

8329. To establish a rate of \$4.75 per net ton on **stone**, viz.: **limestone** or **marble**, ground or pulverized, C. L., as per Item 8117 of S. F. T. B. Northbound Commodity Tariff, minimum weight 60,000 lb., from Cartersville, Ga., to Mishawaka, Ind.

8332. Proposed rates on **ground or pulverized limestone**, C. L., minimum weight 60,000 lb., from Dugan, Ky.: To Cleveland, O., 340c; to Pittsburgh, Penn., 360c per net ton—made in line with rates that have been established to Akron, O., Detroit and Battle Creek, Mich., Fort Wayne and Indianapolis, Ind.

8333. It is proposed to establish the following commodity rates (to expire with completion of movement) on **stone**, crushed, C. L. (See Note 3), from Russellville to Hartford, Ky., 50c, from Mt. Vernon to Lebanon, Ky., 60c per net ton. Proposed for the purpose of meeting local quarry competition near the destinations mentioned.

8347. **Limestone**, ground or pulverized, carload, Dugan, Ky., to St. Joseph and Kansas City, Mo., to establish rate of 380c per net ton, minimum weight 60,000 lb.

8367. **Stone, fluxing**, C. L., Elkanah, Tenn. to Big Stone Gap, Va., to cancel the published rate of 102c per net ton on fluxing stone, C. L., from Elkanah, Tenn., to Big Stone Gap, Va. Class rates to apply after cancellation.

8370. **Slag**, C. L., rates on, from Birmingham, Ala., and group to points in Louisiana west of the Mississippi River, including State Line, Ark.-La., and Lorraine, La.-Texas. It is proposed to establish rates on basis of scale prescribed in Appendix 2, I. C. C. Docket 17000, Part 11, sand, gravel, crushed stone and shells within the Southwest, 155, I. C. C. 247, plussed 8c to cover river crossing at Vicksburg, Miss.

8387. **Stone**, crushed, carload, Mt. Vernon, Ky., to Stanford, Ky. Proposed rate on stone, crushed, carload (See Note 3), from and to above named points, 40c per net ton (to expire with completion of movement).

Western

C-41-74. **Rip rap stone** (See Note 2), from stations in Iowa, South Dakota, Minnesota and Nebraska to stations in Iowa. Rates, from and to representative points:

TO ONAWA, IA.	
From	Pres.
Sioux Falls, S. D.	\$0.92
Mankato, Minn.	1.90
Weeping Water, Neb.	.92
Louisville, Neb.	.92

TO SARGENT BLUFF, IA.	
From	Pres.
Sioux Falls, S. D.	\$0.96
Mankato, Minn.	1.06
Weeping Water, Neb.	.92
Louisville, Neb.	.92

TO SIOUX CITY, IA.	
From	Pres.
Sioux Falls, S. D.	\$0.80
Mankato, Minn.	.96
Weeping Water, Neb.	.92
Louisville, Neb.	.92

C-41-75. Rules governing the securing of weights on **sand**, **gravel** and **crushed stone**, C. L., when actual weights not secured, to, from and between points in Western Trunk Line and Southwestern Freight Bureau territories. (See Item 260 of W. T. L. Tariff 207-E.) Proposed—To amend committee and/or individual issues to provide for the same rule as given under 4991, Southwestern, on this page.

C-41-77. **Limestone**, agricultural (suitable for soil treatment), ground or pulverized, in bags, barrels or in bulk, minimum weight: (a) In open top cars (See Note 2); (b) In cars other than open top or tank cars, (See Note 3), but in no case shall the minimum weight be less than 54,000 lb. Proposed rate 165c per ton of 2000 lb., from Quincy, Ill., to the following Iowa destinations: Brooks, Cromwell, Corning, Coburg, Coin, Essex, Hepburn, Nodaway, Northboro, Norwich, Prescott, Page Centre, Stanton, Shenandoah, Villisca, and Yorktown.

D-41-57. **Stone**, crushed, etc., from Ablemans, Lohrville, Montello, Wis., etc., to St. Louis, Mo., and East St. Louis, Ill. Approved docketed proposal, amended to apply only on crushed stone.

D-41-76. **Stone**, crushed, **slag** and/or **gravel**, coated with oil, tar or asphaltum, in open top equipment, C. L. (See Note 3), from Ottawa, Ill., to points in Indiana. Proposed—To approve the following mileage scale for use in publication of specific point to point rates. (Rates in cents per ton of 2000 lb.)

Distances	
10 miles and under.....	96
25 miles and over 10 miles.....	96
40 miles and over 25 miles.....	107
60 miles and over 40 miles.....	119
75 miles and over 60 miles.....	130
100 miles and over 75 miles.....	142
125 miles and over 100 miles.....	153
150 miles and over 125 miles.....	176
175 miles and over 150 miles.....	188
200 miles and over 175 miles.....	199
225 miles and over 200 miles.....	211
250 miles and over 225 miles.....	222

275 miles and over 250 miles.....	234
300 miles and over 275 miles.....	257
325 miles and over 300 miles.....	268
350 miles and over 325 miles.....	280
375 miles and over 350 miles.....	291
400 miles and over 375 miles.....	303

D-41-17. Stone , as described in Item 6805, W. T. L. Tariff 18-N, minimum weight 50,000 lb., from Milbank, S. D., Ortonville, Sacred Heart, St. Cloud and Sauk Rapids, Minn., to Columbus, Neb. Proposed—35c per 100 lb.

E-41-71 (Sup. 1). Sand (river) and gravel, C. L. (See Note 3), but not less than 40,000 lb., from Jedburg, Mountain Ridge, Pacific, Valley Park and Yeatman, Mo., to Alton, Wood River, Federal and Litchfield, Ill. Proposed—To Alton, Federal and Wood River, Ill., \$1.06 per ton of 2000 lb., and to Litchfield, Ill., \$1.18 per ton of 2000 lb.
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E-41-72. Stone , crushed, viz., roofing granules, C. L., minimum weight 80,000 lb., from Wausau, Wis., to Baltimore, Md. Proposed, \$5.60 per ton of 2000 lb.
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E-41-73. Rip rap stone , C. L. (See Note 2), but not less than 50,000 lb., from Mankato and Kasota, Minn., to Wickham Spur, Ia. Proposed, 90c per ton of 2000 lb.
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E-43-16. Stone , natural or cast, C. L., as described and subject to minimum weight provided for in Agent B. T. Jones' Tariff 539, Item No. 10, from points in Indiana as provided in C. F. A. Tariff 539, to Chisholm and Tower, Minn. Proposed, to Tower, Minn., same rates as apply to Winton, Minn.; to Chisholm, Minn., same rates as apply to Chisholm Junction, Minn.

8079. **Stone**, crushed, broken, chatt, rubble, stone dust, screenings, quarry stripplings, C. L. (See Note 2), from Lehigh, Ill., to stations on C. S. & St. L. Ry. in Illinois, viz.: Chesterfield, Medora and Jerseyville, Ill. Proposed, \$1.48 per net ton.

Proposed from E. St. Louis Krause

Chester, Ill.	80	70
Centralia, Ill.	90	90
Nashville, Ill.	80	90
Sparta, Ill.	80	70
Salem, Ill.	88	98
Coulterville, Ill.	80	70

6112-1. **Sand, gravel and stone**, C. L. (See Note 2), from East St. Louis and Krause, Ill., to Mo.-Ill. R. R. stations (rates in cents per net ton):

Proposed from E. St. Louis Krause
Chester, Ill.
Centralia, Ill.
Nashville, Ill.
Sparta, Ill.
Salem, Ill.
Coulterville, Ill.

6947-1. **Stone**, crushed, C. L., from Hannibal, Mo., Quincy and Marblehead, Ill., to Wabash Ry. stations in Illinois.

From Hannibal, Mo., Quincy and Marblehead, Ill.:

To Shepherds, Ill.	Prop.
Meredosia, Ill.	63
Jacksonville, Ill.	76
Springfield, Ill.	80
Riverton, Ill.	88
Lanesville, Ill.	88

8079. **Stone**, crushed, broken, chatt, rubble, stone dust, screenings, quarry stripplings, C. L. (See Note 2), from Lehigh, Ill., to stations on C. S. & St. L. Ry. in Illinois, viz.: Chesterfield, Medora and Jerseyville, Ill. Proposed, \$1.48 per net ton.

I. C. C. Decisions

15399. **Lime**. Muscle Shoals White Lime Co. vs. A. G. S. By division 2. Defendants authorized to establish rates from Denie, Ala., and intermediate points, to points in Louisiana and Alabama, named in Johanson's I. C. C. No. 2301 and to Texarkana, Marshall, Lufkin, Beaumont, Newton and Mauriceville, the lowest applicable over any line to such points constructed on the basis prescribed in the case named, subject to the usual limitations and the 50 and 70% circuitry rule.

15789. **Cement**. By division 2. Parties to Kipp's I. C. C. No. A-2538 authorized to establish rates from Rapid City, S. D., to points in northwestern Iowa, without observing long-and-short-haul part of Section 4 constructed on the scale IV rates in 48 I. C. C. 201, subject to the same terms as imposed in fourth section order 7260.

16250. **Silica Sand**. Indiana State Chamber of Commerce, vs. Baltimore & Ohio, et al. By the Commission. Awards of reparation totaling \$148,528.12 were made to members of the complaining organization and the Owens-Illinois Glass Co., successor in interest to the Graham Glass Co., an intervenor in the case. The awards are to be paid by June 15, and are the result of unreasonable rates on silica sand from the Ottawa, Ill., district to points in Indiana. The complaint was filed September 8, 1924, and several prior reports have been made in the case.

16747. **Sand and Gravel**. George W. Pyott Sand and Gravel Co., et al., vs. A. T. & S. F., et al., and a sub-number thereunder, American Sand and Gravel Co. vs. Belt Railway Co. of Chicago, et al. By division 3. Case dismissed. Title complaint, filed February 14, 1925, covered shipments made in a statutory period between June 8, 1922, and September 10, 1925. The division after several hearings came to the conclusion that none of the complainants' shipments moved over "open routes" for which rates by combinations can be ruled, and that the actual rates were applicable.

Proposed I. C. C. Decisions

21323. **Lime**. Dann-Gerow Co., Inc., et al., vs. A. C. L., et al. By Examiner Burton Fuller. The examiner said the Commission should find the rates assailed

9186-4-TX. **Sand and gravel**, C. L., from Waco Junction, Texas, to Tyler, Texas. To establish rate of \$1.20 per ton of 2000 lb. on sand and gravel, as described in Item 2762 of Texas Lines Tariff 2-M.

unreasonable for the future to the extent they might exceed \$7.50, minimum 30,000 lb., from Genoa, Woodville and Gibsonville, Ohio, to Clearwater, Fla., and \$6, minimum 50,000 lb., from these points to St. Petersburg, Fla.

26534. Silica Sand. Standard Sanitary Manufacturing Co., vs. C. & E. I., et al. By examiner Edgar Snider. Rates from Ottawa, Ill., to Louisville, Ky., proposed to be found unreasonable, until the rates prescribed in the Industrial Sand Cases, 1930, 188 I. C. C. 99, become effective, to the extent they exceed \$2.64 a net ton on shipments routed over routes which did not exceed by more than 15% the distance over the shortest existing route over which the traffic could have moved without transfer of lading. Reparation proposed.

26596. Sand. Norcross Bros. vs. Pennsylvania. By Examiner T. P. Wilson. Recommends that the Commission find rates in the past from Birmingham and South Pemberton, N. J., to Philadelphia, Penn., not prejudicial but that in the future they will be unreasonable to the extent they exceed rates on the Buckland scale, 139 I. C. C. 88. Denial of reparation recommended.

26640. Crushed Stone. Currie Construction Co., et al., vs. C. B. & Q., et al. By Examiner John J. Crowley. Dismissal proposed. Rates and switching charges from Quartzite, Minn., to Creston, Iowa, on shipments made between October 1 and December 15, 1931, proposed to be found not unreasonable.

26673. Talc. E. I. du Pont de Nemours & Co., Inc., vs. New York Central, et al. By Examiner Carl A. Schlager. Rates proposed to be found unreasonable to the extent they exceeded 22.5% of first class, minimum 60,000 lb., applicable at the time the shipments moved, after June 20, 1931, from Emeryville, N. Y., to Chicago, Ill., and Philadelphia, Penn., and after September 13, 1932, from Emeryville to Everett, Mass. Reparation proposed.

I. C. C. Reports

20039. Agricultural Limestone. National Mortar & Supply Co., vs. Ann Arbor, et al. By the Commission. Reparation bases from Gibsonburg, Ohio, to destinations in the lower peninsula of Michigan were determined to be as follows: On shipments to the specific and intermediate points covered by the tariff, effective August 26, 1926, to the extent they exceeded rates then established; and to destinations to which rates were not established on August 26, 1926, to the extent they exceeded the Michigan intrastate scale applied.

23226. Molding Sand. Ayers Mineral Co., et al., vs. A. C. & Y., et al. By the Commission. Amount of reparation determined and ordered paid by June 15 to intervener, Walworth Co., on shipments from Blissfield, Zanesville and Kent, Ohio, to South Greensburg, Penn. Shipments were made between June 2, 1928, and October 4, 1932.

26492. Common Sand. Frank Lewis & Sons, Inc., vs. D. & H. By division 5. Dismissed. Rate from Lanesboro, Penn. to Afton, N. Y., found not unreasonable on shipments involved—moving between May 3 and June 13, 1932.

Crushed Stone in Chicago

19610. Crushed Stone. Representatives of the Chicago and Illinois Western have asked permission to put in effect an emergency rate of 30c a ton from quarries on

their line to a building project of the Chicago Sanitary District at 39th street and 52nd avenue. The stone from these quarries is suitable for this project, and the quarry spokesmen promised to avail themselves of this 30c rate, if effected, in spite of the fact that trucking companies have quoted them a rate of 24c. A number of quarries not located on the C. & I. W. line protested this proposed rate reduction, however, as tending to give the quarries on this line an undue advantage and shutting out all others from bidding. The present rate is 60c.

Intrastate Surcharges Imposed

RAILROADS having interstate routes serving points in Minnesota in competition with railroads having intrastate routes within the state have been authorized by the commission to remove Ex Parte No. 115 surcharges. Similar action is expected for other states where interstate routes are in competition with intrastate routes and where the states have not permitted surcharges to be placed on state traffic.

Another expected development is the initiation of thirteenth section proceedings with regard to the refusal of states to permit the imposition of surcharges on traffic within their borders.

Ohio proceeding, No. 26960, will probably be discontinued as the Ohio commission has decided to permit surcharges on intrastate traffic to go into effect June 1.

In Oklahoma, where increases on certain commodities have been allowed, further consideration is yet to be given to sand and gravel and glass sand.

In Oregon, increases have been announced except on cement, for which there is a stipulation that there shall be no increase.

In Virginia, the increases allowed except dolomite, ground or pulverized, and ground limestone.

In Georgia a hearing is set for June 10; in Montana a hearing was scheduled for May 27.

In South Carolina, where the state commission, upon reconsideration, allowed the railroads to increase their rates in keeping with I. C. C. increases, exception was made for road building material such as chatts, chert, stone (broken or ground), ashes, cinders, gravel, slag, rip-rap, sand and gravel in open top cars, and crude phosphate rock.

In Washington state, the approved increases exempted cement shipments because of the heavy shipments to Coulee and Bonneville dams.

The Union Pacific Railroad has requested the I. C. C. to eliminate the surcharge on cement between Lime, Ore., and points in Idaho.

Intercoastal Silica Sand Rate

SECRETARY OF COMMERCE ROPER has found not justified a proposed schedule of the Nelson Steamship Co. reducing its rate of \$2.73 to \$2.50 a net ton on silica sand, in bulk, in lots of not less than 500 net tons, for manufacture of glass and glassware, from Baltimore, Md., to Al-

meda, Los Angeles Harbor, Oakland and San Francisco, Calif., Portland, Ore., and Seattle and Tacoma, Wash. The finding is without prejudice to the filing of a new schedule naming the proposed rate in such manner as to make its application free from execution of contracts with shippers. The purpose of the carrier's proposal was to enable one producer of silica sand with plants in West Virginia, Pennsylvania and New Jersey to meet Belgian competition in Pacific Coast markets, where the desired quality of silica sand is not produced. Secretary Roper felt, however, that the terms of the proposed schedule would create a monopoly.

South to North Lime Rates

TESTIMONY to show that the Gager Lime Manufacturing Co., Sherwood, Tenn., is prevented from developing business in the Ohio market by high freight rates was offered at a hearing before Interstate Commerce Commission Examiner C. W. Griffin at Chattanooga on April 8.

The hearing is on the complaint of the Gager company, which is seeking rates no higher on a per mile basis than those enjoyed by manufacturers north of the Ohio river from its plant to points in Ohio, Illinois, Indiana and West Virginia.

Also heard was a similar complaint filed by the Williams Lime Co. of Knoxville. The Gager company filed a petition to intervene in the Williams company case and that company filed an intervention in the Gager case. Representatives of lime manufacturers from the Birmingham district also made their official appearance in the case, but announced they would later give their position in the case.

Protest Freight Rate Increase

EIGHT ALABAMA FIRMS dealing in slag, sand, gravel and crushed stone are seeking to obtain an interlocutory injunction in the local U. S. District Court against a 7% increase in freight rates by railroads. The increase, which is not to exceed 1c per 100 lb. and is not to apply where the existing rate is \$1 a ton or less, was recently approved by the Interstate Commerce Commission and is scheduled to continue until June 30, 1936. The plaintiffs are Birmingham Slag Co., American Gravel and Sand Co., Kirkpatrick Sand and Cement Co., Montgomery Gravel Co., Roquemore Gravel and Slag Co., Southeastern Sand and Gravel Co., Underwood-Walker Co., and Woodstock Slag Corp. Application of these and other petitioners through the National Crushed Stone Association, the National Sand and Gravel Association and the National Slag Association to the Interstate Commerce Commission to cancel the increase on these commodities was unsuccessful.

Cunard-Long Concrete Co., Columbus, Ohio, has added a retail coal business to its concrete products line.

Lime Producers' Forum

Conducted by Victor J. Azbe,
Consulting Engineer, St. Louis, Mo.

Lime Kiln Reactions

TO A GREAT MANY a lime kiln is something very simple and the process taking place therein very ordinary. Chemically only a few reactions are supposed to take place, of the kind taught in the elementary schools. All that there is supposed to be to it, is applying heat to limestone in any old way, and the result is lime.

However, when purity, availability, color and other quality factors become important this lime making process immediately becomes complex; and the more one studies it the more intricate it appears and the further one gets from a complete understanding. This is so both from a physical and a chemical viewpoint.

Rather than only three or four reactions taking place, as ordinarily assumed, there must be a hundred or more with many of them affecting the product in some manner, some actually affecting it to such an extent as to make it useless.

The following list is far from complete. It contains only a few reactions of possible lime and silica combinations or lime and alumina or lime and iron. The arsenic reactions, the phosphorus, all so important along certain lines, are not given and a host of others of which the writer has no inkling but which are certain.

In the list are the sulphur reactions with formation of sulphates and sulphides; reactions of lime with silica and alumina and iron to form low melting point slags that may destroy in part the porosity of lime and lower availability. It does not take much of an impurity to make a great deal of difference, particularly little is needed to affect the color harmfully. Traces of manganese color the lime, but iron of a particular form and distribution can also be an extremely bad actor. There are good limestones analyzing high that have very small amounts of impurities, but because of these small amounts are useless. There are other good limestones that calcined in one way make perfectly white lime and in another way lime as dark red as building brick. Many discolored limes, most in fact, could be white or at least whiter, if treated in a special way, and the only question is, is it worth it?

Most discoloring reactions are oxidations, and absorption of oxygen can be measured. It is surprising in amount and surprisingly, in at least one instance, it took place in the kiln lime cooler. Operating the cooler in one way, lime was dirty brown and red; operating it in another, lime was perfectly white.

While over many things that go on in a kiln we have no control, an understanding nevertheless is desirable, for then ways to

control may gradually be found. Mistakes that may prove costly to someone may also be avoided. A limestone may have 97% CaCO_3 , but that far from proves it a good limestone. It is what the other 3% will do that determines the issue.

Reactions

These reactions either do, or are likely to, take place in a lime kiln:



Dissociation of calcium carbonate



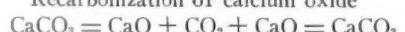
Dissociation of magnesium carbonate



Selective dissociation of dolomite



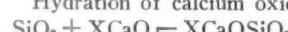
Recarbonization of calcium oxide



Calcination and recarbonization within lump



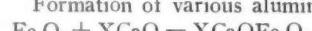
Hydration of calcium oxide



Formation of mono-, di- and tri-calcium silicates



Formation of various aluminates



Formation of various ferrates



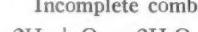
Conversion of CaO by SO_2 to sulphate



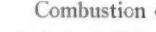
Complete combustion of carbon



Incomplete combustion of carbon



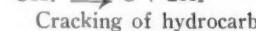
Combustion of hydrogen



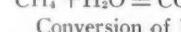
Combustion of sulphur



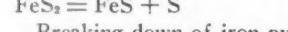
Cracking of hydrocarbons



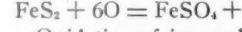
Conversion of hydrocarbons by steam



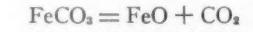
Breaking down of iron pyrites



Oxidation of iron sulphide



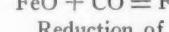
Dissociation of iron carbonate



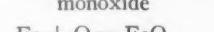
Reduction of ferrous iron by hydrogen



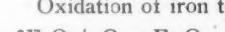
Reduction of ferrous iron by carbon monoxide



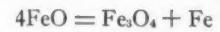
Oxidation of iron to ferrous form



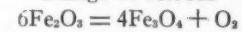
Oxidation of ferrous to ferrosoferric



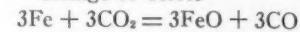
Oxidation of ferrosoferric to ferric



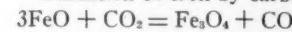
Change of ferrous



Change of ferric



Oxidation of iron by carbon dioxide



Change of ferrous to ferrosoferric by CO_2



Partial reduction of ferrosoferric by H_2



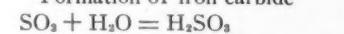
Oxidation of iron by water



Partial reduction of magnetite by CO



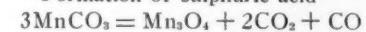
Formation of iron carbide



Formation of sulphurous acid



Formation of sulphuric acid



Dissociation of manganese carbonate

The "Why" of the Cedar Hollow Lime Handling Methods

THE EDITOR: The article by Mr. Azbe in the April issue of ROCK PRODUCTS, regarding the lime handling and loading plant at Cedar Hollow, leads me to write you of some interesting facts that led to the early development of this form of equipment.

Although the first lime cooling system in its present form for large production, was erected at Cedar Hollow in the winter of 1912-13, the original equipment was first developed four years earlier at our McCoy Plant near Bridgeport, Penn.

Our company purchased this plant from Alec McCoy, son of the founder, in 1905. It consisted of a row of old stone front draw and blow kilns (since abandoned) and two excellent "double" kilns that are still producing with fine efficiency. These two kilns were located down in the old quarry bottom, and the railroad siding was so steep and tortuous that the two connecting railroads declined to send their locomotives down to serve the kilns. Of course, following the general practice of the day, cars were spotted in front of the coolers and were filled directly by wheelbarrows from the partially cooled lime on the hearth. Forkings were piled outside the cars.

Accordingly, it was necessary for the plant to have its own steam locomotive; a small, it is true, but nevertheless a serious financial load on a plant of such moderate output.

I have heard that Texas erected a monument to the boll weevil, and if this is true, then the lime industry should erect a monument to this little 4-wheel dinkie, because it

was the primary cause of the development of the once-modern handling and cooling system for lime that has saved the industry many hundreds of thousands of dollars and freed many workmen of the most arduous jobs around a lime plant.

I used to sit on a high bank overlooking the plant and try to visualize how a railroad line could be got to those kilns, which the regular shifting locomotives of the railroads could negotiate. That was before the days of airplane views, and I had no map of any value. At last, the inspiration came. If I could not get the railroad to the kilns, why not get the lime produced to the railroad?

Today, it looks simple and logical, but at that time, it was pioneering. All the then old-timers in the industry frowned on the idea. That sterling old character, "Billy" Irvin, dean of lime producers in the Philadelphia district, said positively it would ruin the lime—"It was well known that lime must lose its heat in the car."

Fortunately, I had a new superintendent at the time, Caleb W. Wilson, who was so new in the lime business that he had not yet learned of all the things that couldn't be done. He thought my idea had merit. Harvey W. Smith, general superintendent at Cedar Hollow, was always optimistic and helpful. The company itself was exceedingly skeptical about such a crazy idea which had no precedent. But thanks to the little locomotive, whose costs hung like a millstone around our neck, I finally secured the necessary approval for the installation.

The hearths were cut from under the cooler to ground level and the 24-in. gauge track laid in. The cooling bin and loading equipment were of necessity up in the railroad yard, and the small track from kilns to cooling bin had many strange grades and curves—still has, I might add, for it has not been changed in these 26 years of successful operation.

The essential principles were worked out—a low, wide cooling bin to handle the lime with a minimum of breakage (lump lime was important then, for hydrate was only in its infancy), the pan conveyor to bring out the run-of-kiln lime, the screen and a combined picking and loading belt. That was before the days of the portable box car loader, so the best we could do was to deposit the lime by conveyor on the floor of the car between the doors and continue to use man power to pile it up in the car ends.

The fines went to the ground lime plant for grinding for the farmer. We had considerable of that business but no hydrate plant at McCoy at that time.

Origin of Portable Box-Car Loaders

In due course, Howell Pratt, sales engineer of Link-Belt Co., made one of his periodic visits. Many of your (our) readers will remember the cultured and well-informed Howell Pratt who was ever helpful to the troubled lime producer. After talking the matter over with Mr. Wilson, he decided that he could make a portable

conveyor that would do the job. Soon after, there arrived from the shops of the Link-Belt Co. a strange contraption. Of course, it wouldn't work at first, but Caleb Wilson and Howell Pratt made various modifications until it functioned satisfactorily. This was the first of the later well-known "Pratt loader." Today, this piece of equipment is a standard product of many concerns, and the loaders themselves are seen everywhere in all industries. Another credit should be chalked up to the little locomotive. Incidentally, this original loader is still in service at McCoy. (Page Henry Ford!)

Even before the advent of the Pratt loader, the economies of the new system of handling the lime were great. Eliminating the locomotive was only part of the story. The quick drawing of the kilns increased their capacity and efficiency. Arduous labor was done away with. There were many other contingent advantages.

Naturally, I wished to make these economies available to the larger Cedar Hollow plant. But as Mr. Azbe said in his article, Cedar Hollow was sprawled out with many different types of kilns. Time and again, I made layouts only to discard them as impracticable. The ever optimistic Harvey Smith became pessimistic. Repeatedly, I gave up in despair, only to get a new hunch and tackle it again. Finally in 1912, I evolved the present layout, and it was built in the winter of 1912-13.

Fine Points in Design of Cooling Bins

Although the essential principles had been worked out at McCoy, Cedar Hollow presented its own new problems. Of much larger output, it was necessary to have a very large cooling bin, so that loading could be done in a single daytime shift. Double-shift loading would have defeated the economy. Hence the development of the saw-tooth bottom bin with multiple outlets. This gave the low, wide bin, necessary for the protection of the lumps against breakage and to permit the passage of air for cooling. This design of bin became standard with all subsequent installations. However, I would here note an interesting fact. I have seen a number of such installations subsequently made at other plants. In general, they were well engineered and structurally good. But their designers invariably omitted or neglected certain technique which we had worked out by careful study and thought. I might mention the shape of the bin to save the lumps (now generally done but not necessary), means to facilitate the passage of the cooling air, method of automatically feeding the lime to the pan conveyor, proper relationship of screening and picking, and other fine points. It is possible to copy, but the copy always lacks something of the original, whether it be old master or just a lime handling system. I have yet to see the equal of the old Cedar Hollow bin in its operating perfection.

Another serious problem in developing the Cedar Hollow layout, was how to secure suf-

ficient rapidity of loading. In those days, Cedar Hollow frequently shipped over 250 tons of lump lime daily. If this were to be done in a single shift, the maximum rate of loading must be at least 40 tons per hour to allow time for moving cars and for delays. Hand work, such as was being successfully done at McCoy, was out of the question. The portable box car loader had not yet been thought of; Howell Pratt hadn't arrived.

Then I ran across the Manierre box car loader, and got in touch with Mr. Manierre of Milwaukee. This machine had rather a specialized use—lump coal and coke, also sulphur, where they wanted to preserve the lumps. That was our problem. But I had to travel north and west of Chicago to see these machines in operation to be sure they were suitable to our purpose. There were none in the east nor in the lime industry anywhere.

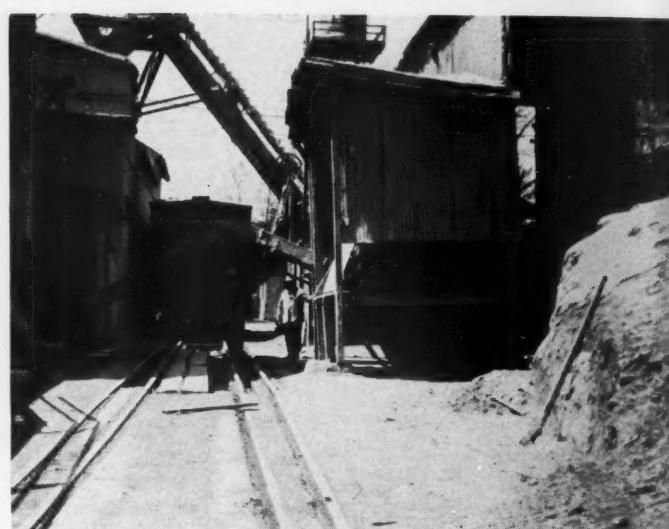
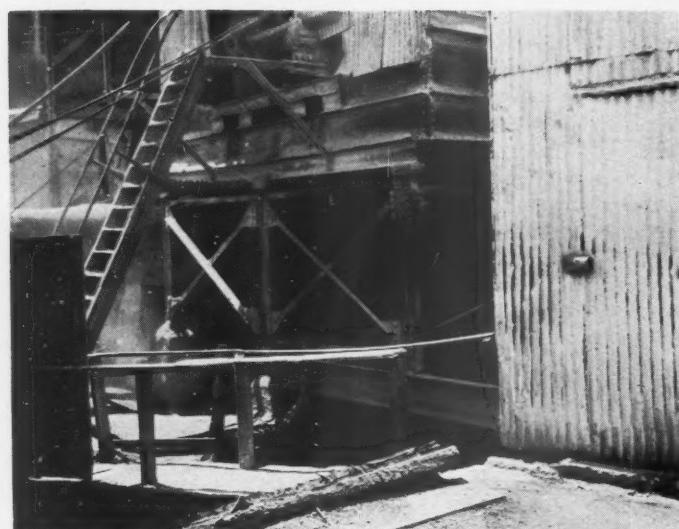
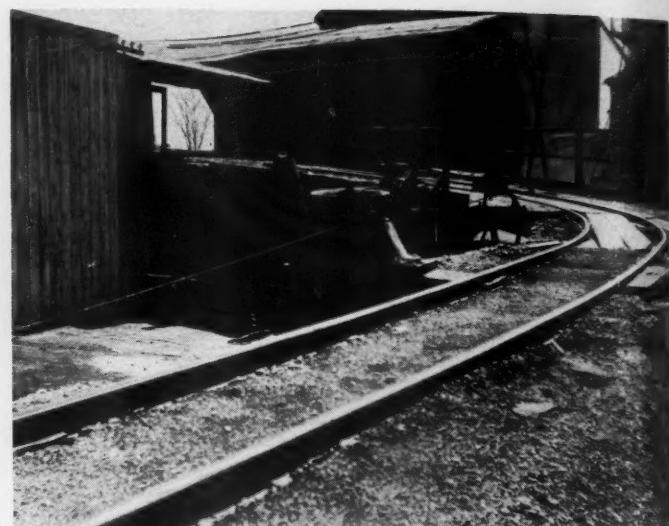
The Manierre loader became the standard equipment in all installations of large production, and justifiably so, for it is a fine, well-made machine. In 22 years of daily use, it has never failed us. Times have changed, and shipments of lump lime are comparatively light, so that few installations today would require such a fine piece of equipment. But the first Manierre loader in the lime industry is still rendering faithful service at Cedar Hollow today.

Installation Removed Causes for Past Complaints

The Cedar Hollow equipment was a great success from the start and soon paid for itself. I have seen a 40-ton car loaded to the roof in 45 minutes. I have seen 15 cars loaded in 9 hours. Here at Cedar Hollow, as at McCoy, the cars were standing on the scales when loading, so that true net weights were given. It took a lot of explaining to the trade that the exact weights were not faked.

We had other troubles. Hand-loaded cars were dressed up like the top apples in a barrel. The cars were not dressed any more and didn't look so well. But the consignees soon found that there was good lump lime beneath. Breakage was somewhat greater and caused some criticism. But in many respects, the lime was actually better. Being loaded only in the daytime at a central point, inspection and picking were better. A strange improvement occurred. We were frequently troubled with "fish egg" lime, that is lime that crumbled to a sandy mass on cooling. Heretofore, such lime would get into the car while hot and solid, only to disintegrate during shipment. Thereafter, it cooled in the bins and passed out with the screenings. Fish egg complaints never again occurred.

Even before building the plant, we knew that actual box car tares varied considerably from stenciled weights, there often being up to 1500 lb. difference on old cars of western railroads. We light-weighed all cars so that customers got exactly what they paid for. And in so doing, we helped ourselves, for at



Figs. 1 and 2: (1) The curved trestle carrying 24-in. track from the kilns. The cooling bin is in the left central distance. To the right is seen the bucket elevator carrying crushed and fine lime to the hydrating plant. The original steel storage tank in the background. (2) A view of the 24-in. track leading to the cooling bin.

Figs. 3 and 4: (3) The lime cooling bin from the hoist end, showing the inclined pan conveyor for feeding out of the bin. The cooling bin was made as wide and shallow as possible with minimum angle so as to avoid breakage of lime and to secure maximum cooling effect. (4) The car loading point showing the track scales upon which the cars are spotted while being loaded. At the time this picture was taken the loading conveyor was delivering to a temporary chute for sending lump lime to the truck loading bin. The loading conveyor is a belt conveyor with a jack knife frame so that it can be put into the car after spotting

Figs. 5 and 6: (5) A general view of the lime handling and storage system from the east. Truck loading bin in the center foreground showing the original steel lime storage tank 40 ft. in diameter and 40 ft. to the eaves. (6) The lower part of the original Pratt box car loader. It is to be noted that this loader was originally provided with small swivel casters. The plant has never been able to change to the more modern loader with large wheels on account of the cramped location.

that time, the average of all box car tares was 400 lb. under the stenciled weight, which meant that we had been giving away 400 lb. of lime with every car. At the end of the year, that amounted to quite a bit in the days of heavy lump lime shipments. I don't know how the cars average today, but do know that the error is much less.

Cylindrical Silos Introduced

There were a number of other firsts at the little McCoy plant which may be of historical interest to readers. It was here that quick lime was first stored in quantity so as to be available for the rush agricultural shipments. I think it was in 1905-6 that we built a circular steel tank with conical roof. The tank was 40 ft. x 40 ft. and held 2000 tons of ground lime for the farmer. Old "Billy" Irvin said lime wouldn't keep, but my brother, Charles Warner, and I had made some experiments in tin cans and learned that it would. It seems simple enough now when every well-ordered lime plant has its airtight storage for quick lime, but the old timers of 1905 said it couldn't be done.

Col. Henry S. Spackman, of Philadelphia, well-known cement engineer, now deceased, came out to see this tank. He was much impressed. At that time, portland cement was stocked in long, low warehouses with partitions forming bins. Binning out was done by gangs of men with large hoes. Col. Spackman expressed the opinion that the tall cylindrical bin was the proper development and would be adopted by the cement producers. Forty feet with a 15 ft. peak looked high then. He was right, and the first of the prototype was at the McCoy plant.

Gravity Switching

The Pennsylvania Railroad came into the plant from the upper end, and the Reading Railway entered from the lower end. We joined all tracks, eliminated all dead-ends and soon had a small but perfect gravity railroad yard. And that was before the railroads themselves were awake to the great economies of gravity switching. Later, Cedar Hollow was developed the same way, and although Cedar Hollow has on occasion shipped over 50 cars daily, it never needed its own locomotive.

I also wonder whether McCoy was not the first lime plant to use purchased electricity supplied by high tension from a remote power plant. It was electrified in the spring of 1914. But even without this added laurel, which is of little moment, this small plant near the banks of the Schuylkill, not far from Philadelphia, was the first to employ a number of devices that helped to revolutionize the industry—lime handling, portable car loader, storing quick lime and use of tall cylindrical storage tanks.

But there is an epilogue to the story of the lime handling and cooling system. Thanks to Mr. Azbe's scientific work and the practical effort of others, we can now produce lime containing much less heat than hereto-

fore, leaving the heat in the kiln where it does some good.

Also, lump lime is much less in demand than it once was. So the original system as originated at McCoy, as perfected at Cedar Hollow and extensively installed at other points, is no longer "up-to-date." With the growth of hydrate and decline of lump lime, cheaper installations can be made which will better serve present day requirements. But it filled an important niche in the industry in its day, and much of the accepted modern technique of handling lime was simply an outgrowth of the original system. And it all came about because a little 4-wheel dinkie made a nuisance of itself.

IRVING WARNER,
Vice-President, Warner Co.
Philadelphia, Penn., April 15, 1935.

Lime

Marianna Lime Products Co., Marianna, Fla., is planning to resume operations soon, after a shutdown of about nine months.

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Tyrone Lime and Stone Co., Tyrone, Penn., recently bought group life insurance for the protection of its 55 employes, totaling \$58,500. Policies ranged from \$1000 to \$2500, according to rank. The Prudential Insurance Co. of America issued the policy and it is of the contributory type, the employes themselves paying a part of the premium and the remainder of the expense being assumed by the employing company.

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Calera Lime and Cement Co., Calera, Ala., is the new name for the former Alabama Lime and Stone Corp., whose plant has been closed for about six years. It is reported the new company will soon resume operation, and will install new modern equipment to make lime for all purposes; the company may later build a one-kiln cement plant.

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National Lime Association, Washington, D. C., has initiated a national safety contest competition to be conducted in coöperation with the U. S. Bureau of Mines. Trophies will be awarded by the association annually, beginning in 1936. The first contest starts July 1 and closes December 31, 1935. After that they will last the full calendar year. All lime manufacturers may enter, whether members of the association or not. There will be two classes: (1) plants employing less than 50; (2) plants employing 50 or more. A trophy will be awarded the winner in each group for the best no-accident record. Application blanks have been mailed to all lime manufacturers. Any who failed to receive his may get one by writing the National Lime Association.

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Rockland & Rockport Lime Corp., Rockland, Me.: Plan of financial reorganization was established with approval of U. S. District Court on April 1.

Louisiana Lime Products Corp., Shreveport, La., is now getting its limestone from Palmer, Woolf and Gray (formerly Louisiana Quarry Co. plant) at Winnfield, La. This is a very pure washed limestone. The limestone at the site of the lime plant proved unsatisfactory for a high grade lime.

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Sand-Lime Brick Production and Shipments in April, 1935

THE FOLLOWING DATA are compiled from reports received direct from producers of sand-lime brick, located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Six active sand-lime brick plants reported for the month of April, 1935, this number being one less than the number reporting for the month of March, statistics for which were published in May.

Average Prices for April

	Plant Price	Delivered
Mishawaka, Ind.	\$9.25	
Syracuse, N. Y.	14.00-20.00	\$16.00-20.00
Saginaw, Mich.	10.50	
Madison, Wis.	15.00	

Statistics for March and April

	March†	April*
Production	114,800	345,360
Shipments (rail)	20,000	104,000
Shipments (truck)	413,997	342,562
Stocks on hand	810,514	345,774
Unfilled orders	925,000	850,000

†Seven plants reporting; incomplete, two not reporting unfilled orders.

*Six plants reporting; incomplete, three not reporting unfilled orders.

Portland Cement Pavement Yardage

AWARDS of concrete pavement for April, 1935, were announced by the Portland Cement Association as follows:

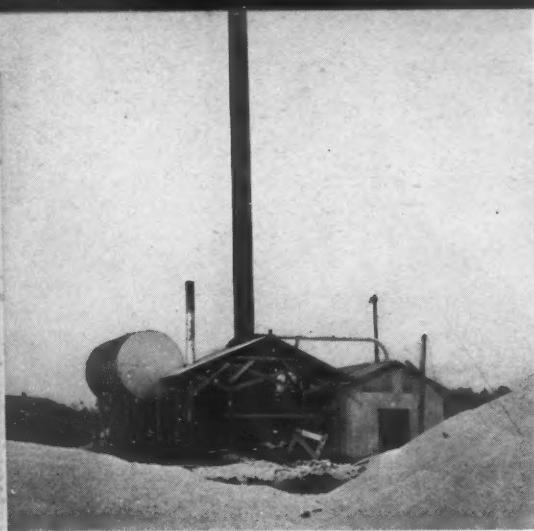
	Total sq. yd.	Sq. yd. awarded during	for year to date,
		April, 1935	Apr. 27, 1935
Roads	825,504		6,843,000
Streets	876,902		2,974,205
Alleys	3,327		31,731
	1,705,733		9,848,936

Sand and Gravel

Ross Construction Co. has purchased the old gravel plant from Vic Essen, Clayton, Mo., and is shipping it by barge to the site of the bridges being built on the lake near Hurricane Deck, Mo. This gravel plant was operated by the Victor Gravel Co. The Missouri Pacific R. R. built a switch along the bank of the river, but when the water came up over the track, the gravel company collected damages from the Union Electric Co. and let the plant stand idle for about four years. A crane was brought in on the Missouri Pacific, the old gravel plant, the tower torn down, and the crane and all material is being shipped by barges to the site of the bridges.

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Dan Walters Sand Co., Manhattan, Tex., has purchased the former **City Sand Co.** Dan Walters is sole owner.



Electric power generating plant of Kivett and Reel Co.

Southern Dredging Operation Electric Power With

By Bror Nordberg,
Associate Editor, Rock Products

KIVETT AND REEL CO., for the past two years, has been operating a sand and gravel dredging operation at Sun, La. The plant is completely modern and permits ease in getting to and seeing all parts of the operation.

The overburden varies from 12 in. to 5 ft. in thickness, which as a rule is pumped with the sand and gravel, and is separated out in the screening plant. When stripping is done, it is accomplished by a Bucyrus-Erie 1-yd. drag-line.

The material is taken from the deposit by an 8-in. Amsco pump mounted on a dredge. The intake end is elevated and lowered by a hoist manufactured by Domestic Engine and Pump Co. Two auxiliary pumps are also on the dredge, for use in priming the dredge pump. A centrifugal pump capable of pumping 75 g.p.m., manufactured by the Chicago Pump Co., is in continuous use in pumping water into the packing in the shaft of the dredge pump.

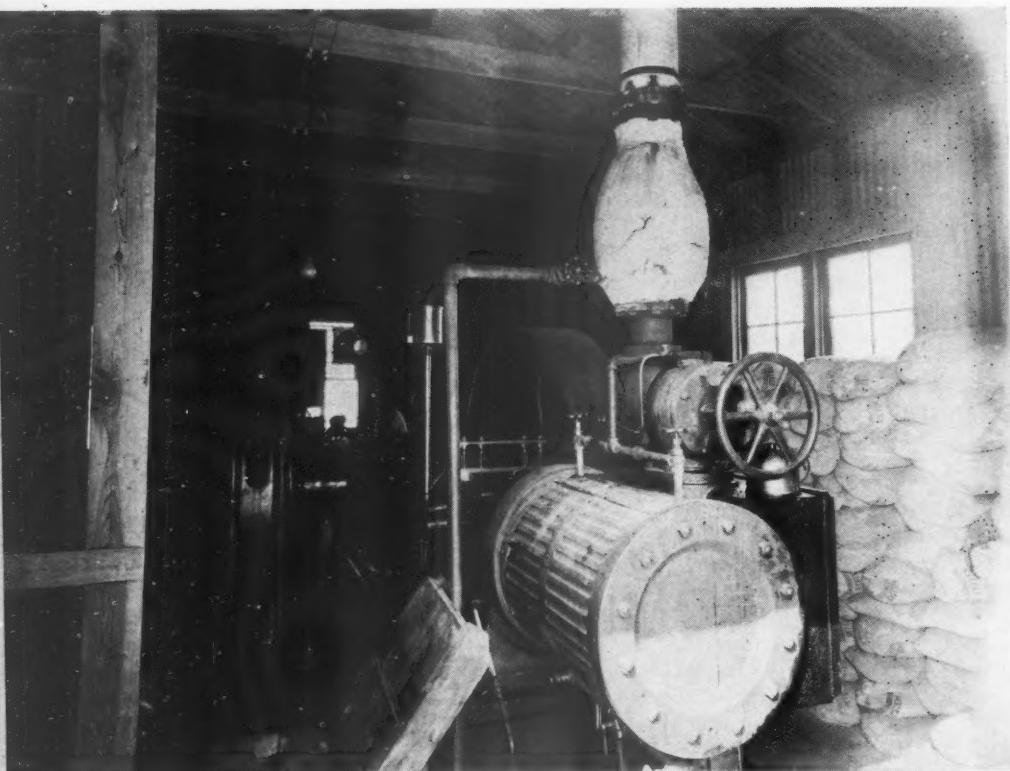
The other pump, a Myers, with 4-in. diameter and 4-in. stroke, is also pressed into service at times to help prime the dredge pump. About 140 ft. of 8-in. pipe carries the material over steel pontoons and elevates it 28 ft. above ground level to flat gravity scalping screens. Here all material under 3/16-in. is removed and is carried by a wooden launder to a sump.

The gravel is carried from the flat screens by means of 24-in. Link-Belt belt conveyor, 200 ft. long, to the screening plant, 37 ft. above the ground. This belt is driven by a 20-hp. G-E motor. Two Link-Belt conical screens are mounted on a single shaft, and are driven by a 7½-hp. United States motor. Each of the screens is 9 ft. in length and has end diameters of 3 ft. and 6 ft. The wire cloth is easily interchangeable, permitting supplying gravel of any size desired.

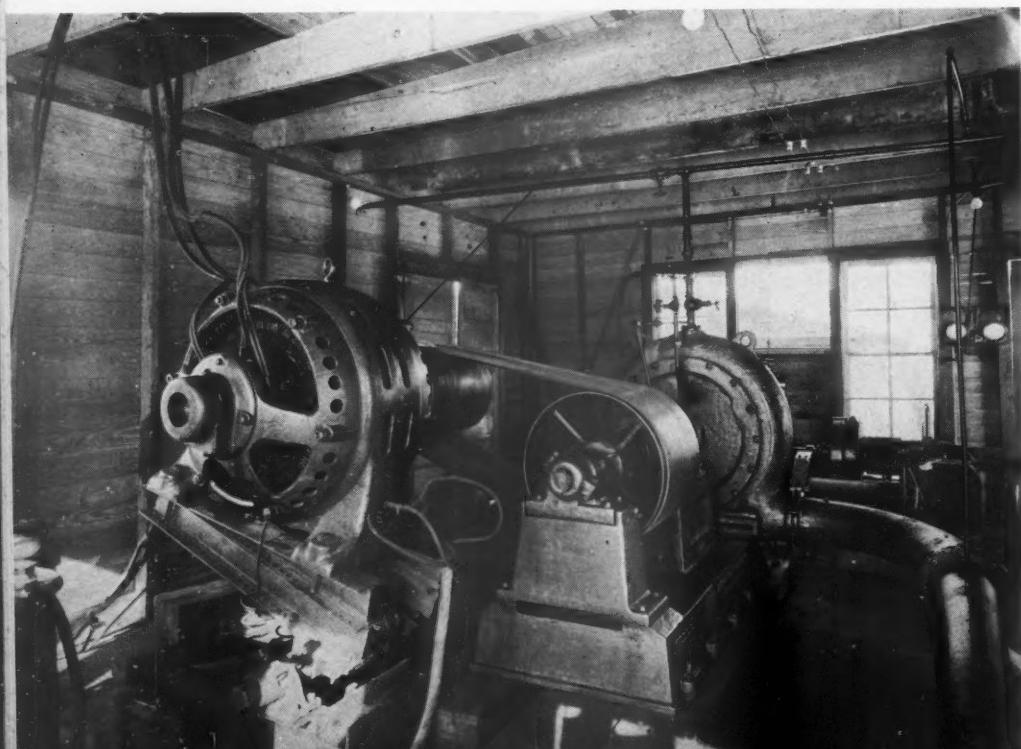
All material below ¼-in. flows through a wooden launder to a stock pile. Sizes over ¼-in., up to the limits desired, drop into two bins directly below, each having a capacity of 80 cu. yd. Railroad cars pass under these bins and load, or trucks load from the sides of the bins. The plant has a capacity of one car of gravel per hour. Most of the gravel produced is used for concrete and bituminous road surfacing.

Wash water for the Link-Belt conical screens is supplied by a pump manufactured by the Union Steam Pump Co. This pump has an 8-in. suction and a 6-in. discharge and is driven by a 25-hp. Allis-Chalmers 3-phase, 60-cycle motor.

For the last eight months, the plant has



Above: Interior of power plant. Below: Electrically-driven dredge pump



Makes Own Steam

furnished its own electric power. The electrical unit is located in its own power house, adjacent to the boiler. A boiler, made by Walsh and Weiderer Boiler Co., is fired by fuel oil and supplies steam under 125 lb. pressure to drive the a.c. G.-E. generator, which supplies 210 hp. at a voltage of 2300. The exciter is a d.c. G.-E. generator requiring 10 hp., operating at 125 volts. A storage silo for fuel oil of 10,000 gal. capacity is adjacent to the boiler.

Crushed Stone

Mathieson Alkali Works, Inc., New York City, has closed a lease and royalty contract on 300 acres of quarry property in Burnet county, Texas, where it is expected to mine and ship 150 tons of dolomite daily.

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Standard Lime and Stone Co., Baltimore, Md., is opening a new quarry near Strasburg, Va., on the Baltimore & Ohio R. R. The first car of flux stone was shipped May 14. It is reported locally that two rotary kilns to make lime will be installed.

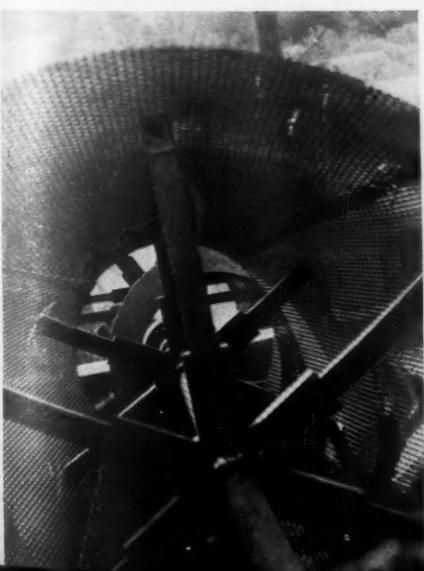
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Dolcito Quarry Co., Birmingham, Ala., recently conducted a prize competition for the best yields of peas, vetch and clover, for farmers using the company's magnesium limestone. The first prizes were \$10 in cash. The yields were clover, 33,495 lb. per acre; peas, 13,920 lb. per acre; vetch, 17,835 lb. per acre.

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Hurst Quarry, Maquoketa, Iowa., is being reopened. Fred Hurst is manager. Only stone will be produced at present. The lime kilns are said to have been built

Type of screen used



General view of dredge pond and plant



Plant is simple with widely separated units

to burn wood, and wood fuel is not economical now.

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Sturgeon Bay Materials Co., Sturgeon Bay, Wis., has leased the quarry of the Sturgeon Bay Co. and has commenced operations. Capt. John Roen is president of the new company, whose lease includes property on Drummond Island, Mich. Capt. Roen is president of the Sturgeon Bay Shipbuilding and Dry Dock Co., the Roen Steamship Co., the Northwestern Co., the Northwestern Dredging Co., and the Motorship Transportation Co. N. A. Hansen is in charge of the quarry operation. It is reported that the Drummond Island property will probably be developed to supply stone for a Lake Superior project. The Sturgeon Bay quarry and crushing plant has furnished a large tonnage of commercial stone for water shipment to various lake ports. The stone is a dolomite.

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Pacific Limestone Products Co., Santa Cruz, Calif., Fred Johnson, president, has grown to local importance as the producer of "Kalkar" chicken grits and flour. The plant is in the center of a large poultry industry and in the first quarter of the year shipped 2000 tons of its products to four counties. Mr. Johnson has specialized in this field and made perhaps

the first "chicken census" ever made in connection with a crushed stone enterprise. In a survey just completed of 500 ranches within the 50-mile radius, it has been revealed that the feathered population totaled 522,526 birds, and 85.06% of these are being fed on Kalkar. Of this number 57.30% are fed on Kalkar grit alone; 28.24% are being fed Kalkar with oyster shells prepared by the local plant, and 85.06% are being fed Kalkar products in one form or another. This grit is claimed to be the hardest limestone grit sold in California. It contains iron, sulphur, magnesium, silica and calcium in a natural mixture. A bluish color is from fine carbon or charcoal in its composition. An odor arising from the handling or rubbing of Kalkar grit is the sulphur fumes contained in the rock.

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Quartzite Co., Lincoln, Kan., is moving its plants to a new location on the Union Pacific R. R. The original plant on the Santa Fé lines will be kept, but with a crushing plant of about half its former capacity.

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Magnesite

Northwest Magnesite Co., Chewelah, Wash., is reported to be operating three of its five rotary kilns, with output about the same as for the same period of 1934.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Trends in Concrete Products Industry Followed by Minneapolis Company

Sand and Gravel Company Successful With Its Products Plant—Ready to Take Up Concrete Ashlar Block and Ready-Mixed Concrete

LATE IN 1932, Hedberg-Freidheim & Co. decided to enter the concrete products field in order to utilize surplus sand and small gravel from the operation at Minneapolis, Minn., started ten years before. In addition to equipment for making concrete block, the company now has added concrete brick manufacturing apparatus and is equipped to turn out brick units at the rate of 30,000 per day.

Planning in advance, the company is preparing to go into the ready-mixed concrete business and also to expand its product line to include concrete ashlar units. Because of extensive publicity which this product has received among home owners and prospective builders, it is believed that the ashlar production will become one of the most valuable and important divisions of the business. From indications at the present time, the company business in 1935 will mean steady operation practically all year.

Upon entering the production of concrete block the company purchased a large automatic plain pallet stripper, which produces 7 blocks, or 14 tile, per minute. Also a large batch mixer of 50 cu. ft. capacity was purchased. The main production unit makes all four sizes of block commonly used in the Twin City area—8x8x16-in., 8x12x16-in., 6x8x24-in., and 6x12x24-in. Using one set of plain wood pallets, the machine



Interior view of Minneapolis plant

turns out the unit rock or bush hammered face.

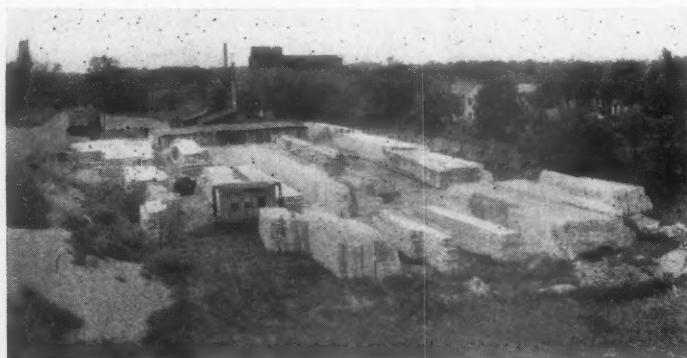
Corner blocks are made in the same way—21 types in all. One of the illustrations shows a line of 6x12x24-in. units going to the curing room.

Long Mix

The large capacity mixer was chosen in order to effect a minimum 10-minute mix for the largest unit mentioned. Following the accepted standard of practice in many

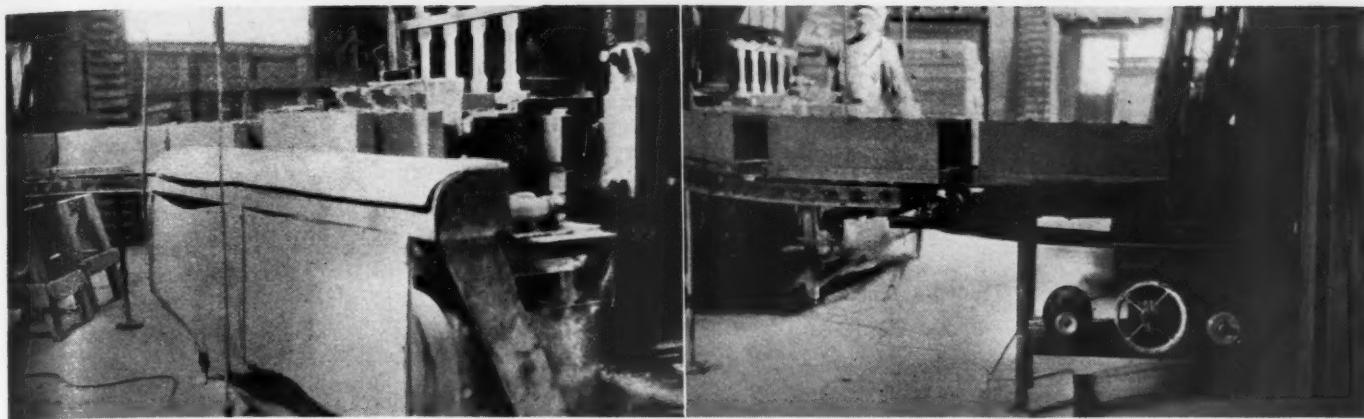
up-to-date plants, the company has found that a comparatively long mix gives maximum strength with the least amount of cement and also steps up the uniformity of product.

Sand and gravel are delivered to the plant in dump trucks. A receiving hopper is located below grade, and a bucket elevator takes the material to bins, from which the discharge is by gravity into volume measuring hoppers directly above the mixers.



Left—Cement brick and block storage yard of Hedberg-Freidheim & Co. Right—Concrete products company's sand and gravel operation





Left—Power roller machine for off-bearing the block, on pallets, to gravity roller conveyors. Right—Belt over power-driven rollers helps push block to curing room

The mix consists of 60% graded sand and 40% gravel up to half-inch size. When materials have been mixed dry for five minutes water is added. Measured through a registering water meter, it is discharged into the mixer by the usual perforated pipe arrangement.

The mixed batch is discharged into a hopper that feeds a 45-deg. inclined belt conveyor, provided with angle iron flights every 18 inches. The conveyor, in turn, discharges concrete into the hopper of the automatic.

Labor Saving Device

Ordinarily one man is required to feed the pallets into the machine. One of the accompanying pictures shows the device used for eliminating manual off-bearing of blocks. This power roller machine transfers the blocks, on pallets, from the machine to the gravity roller conveyors that are connected to it. A belt over the power-driven rollers helps to push the long column of green blocks to the curing room via the conveyor route.

Screening Plant Installed

Hedberg-Freidheim & Co. started operations in April of 1922 by loading trucks direct with teams and scrapers on a 5-acre tract of land in St. Louis Park, a suburb just west of Minneapolis. They planned on entering the block manufacturing business then, but the sand and gravel business seemed to grow to proportions that took all of the management time. Six months after operations began, they completed a small dry screening plant and subsequently added equipment including an 8-inch gyratory crusher to the original operation; in 1926 they built a new plant of 1500 yd. per day capacity to supply the washed sand and gravel market. This plant is in operation today, and for delivering material they have a fleet of 20 Mack trucks.

Adjoining the storage garage is a completely equipped repair and machine shop which serves both the sand and gravel operation and the concrete products plant. Arc and acetylene welding equipment are included here.

Cement Products

Universal Concrete Pipe Co., Columbus, Ohio, has organized a new subsidiary, Universal Corrugated Pipe Co., to make corrugated iron pipe. The company has plants in five other cities besides Columbus.

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Cherry Lake Farms, Inc., Moultrie, Ga., has established a concrete products plant to make materials for 300 dwellings. This is a Federal farm rehabilitation project.

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Kendallville, Ind., has leased the plant of the R. & L. Concrete Products Co. to make concrete sewer pipe with FERA labor.

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L. W. Hayes, Bethany, Mo., has purchased the Adams concrete block plant at Albany, Mo., and moved it to Bethany, where he will manufacture concrete building tile and brick.

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Cherokee Sand and Gravel Co., Knoxville, Tenn., has resumed operation of its ready-mixed concrete plant after about a year's shutdown. The plant is reported to have orders for about 2000 cu. yd. for three new school buildings. W. C. Kinzel, manager, is reported in the local press to be very optimistic over potential business possibilities, particularly private construction.

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Poured Concrete Block Manufacturing Co., Memphis, Tenn., is the name of a new company being organized by Wm. D. Satchfield, Yazoo, Miss., to manufacture and build with his new hollow, waterproof natural air-conditioned, dual wall, poured concrete building blocks and other concrete building material, "for satisfactory and everlasting cool in summer and warm in winter buildings." His plans are to build and operate the first plant in Memphis, Tenn., and he is now raising a subscription among the people of Yazoo City, to put on a mail order stock selling campaign throughout the country. He offers to put

up two shares of his personal stock as security for the loan of every \$10 in cash borrowed, according to a local newspaper.

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Basalt Rock Co., Napa, Calif., A. G. Streblow, president, has announced production of a new lightweight, hollow, webbed concrete building unit under the trade name Basalite. It is said to be both fireproof and insulating. The standard unit is 36x14x18 in. thick, with hollow spaces approximately 5½ in. square, in which reinforcing may be placed, or the spaces may be used for piping and electric conduits. The units may be cut with a saw and will hold nails.

Cement

Statistics: The portland cement industry in April, 1935, produced 6,136,000 bbl., shipped 6,196,000 bbl. from the mills, and had in stock at the end of the month 21,229,000 bbl. Production and shipments showed decreases, respectively, of 6.2 and 4.6% as compared with April, 1934. Portland cement stocks at mills were 1.5% lower than a year ago. The statistics here given are compiled by the Bureau of Mines, from all manufacturing plants except one, for which estimates have been included. The mill value of the shipments—10,676,000 bbl.—in the first quarter of 1935 is estimated at \$16,513,000. According to reports of producers, the shipments totals for the quarter include approximately 304,000 bbl. of high-early-strength portland cement with an estimated mill value of \$584,000. In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 162 plants at the close of April, 1935, and of 163 plants at the close of April, 1934.

	RATIO (PER CENT) OF PRODUCTION TO CAPACITY				
	April 1934	1935	1935	1935	Jan. 1935
The month...	29.6	27.9	18.9	14.9	14.1
The 12 months ended	25.9	27.9	28.0	28.4	28.8

New Machinery and Equipment

New Air Quenching Cooler of the Integral Type

WHEN BURNING cement raw materials, limestone, ores, etc., in rotary kilns, it is an accepted fact that proper cooling is advantageous and effects economy; by saving in fuel through preheating the air for combustion; by increasing the grindability of the clinker, thus saving power and increasing output, and effecting a general saving in wear and tear on the grinding machinery, conveying equipment, etc.; by improving the quality of the cement.

Some plants operating rotary kilns have no coolers; some are using obsolete or inefficient coolers. Today, greater consideration than usual is being given this cooling problem in the general effort being made to reduce manufacturing costs at every point possible.

Types of Coolers

The original type of clinker cooler, as introduced in the cement industry more than 25 years ago and still in use at many cement plants, is the well known rotary, natural-draft cooler, in which the clinker is cooled rather slowly by an air current sucked through the cooler either by the draft in the kiln or by separate stacks. In the latter case, all the heat in the clinker as discharged from the kiln is wasted; in the former case, only a comparatively small part is recovered. This type of cooler is naturally rather crude and inefficient both in cooling the clinker and in the recovery of the clinker heat. It is therefore to be expected that the merits of the modern clinker cooling equipment will soon cause the replacement of the present natural draft coolers with up-to-date equipment.

The first important step towards increasing the efficiency of the original clinker cooler was the development of the rotary pressure cooler. The cooling air for this cooler is supplied by means of a fan, and the internal equipment of the cooler is so designed as to provide for intimate contact between cooling air and clinker. With this cooler it proved possible to reduce the temperature of the clinker to about 150 deg. F. and to preheat the air for combustion to approximately 600 to 700 deg. F. The pressure cooler was introduced to the American industry as early as 1912. Since then, the design has been improved several times, and a number of these coolers were furnished during the following decade. Many of them are still in satisfactory operation in various cement plants in this country and abroad.

During this period several other types of clinker coolers were tried although none was of any great commercial success.

Some 12 or 15 years ago the so-called "integral" coolers (kiln and cooler in one unit) were introduced. They have since found wide application in the cement industry throughout the world and at present there are at least 300 integral coolers in operation. The two best known coolers of this type are the Unax cooler developed by F. L. Smidt & Co., and the Solo cooler developed by the Polysius Corp. These coolers are attached directly to the kiln shell and, while they do not permit cooling the clinker to quite the same low temperature as separate coolers of the pressure cooler type, they have the advantage of greatly simplifying the kiln installation, reducing the cost of foundations and building and improving the overall fuel efficiency due to increased degree of preheating of the air for combustion and elimination of air leaks between kiln and cooler.

Air-Quenching Type

The renewed interest in the cooler problem has brought on the market recently several new clinker coolers of the air-quenching type. This type has the advantage of improved cooling accomplished by forcing the cooling air through a layer of clinker discharged from the kiln. This is of great advantage not only with respect to more efficient heat transfer from the clinker to the air but also to increased grindability of the clinker due to the rapid cooling. Several of these air-quenching coolers, such as the Lee cooler and the Allis-Chalmers cooler, are of the separate unit type, and both of them have been described in earlier issues of this magazine. Another, the "Unax" grate cooler developed by F. L. Smidt & Co., has also been developed based on the air-quenching principle with the advantages of the integral cooler. A brief description of this new cooler follows.

The Smidt Unax grate cooler consists of two parts, one stationary and one revolving. The stationary part comprises an insulated casing surrounding the outlet end of the kiln, and in the bottom of this casing is a stationary grate of rigid design. The revolving part of the cooler is attached to the end of the kiln shell and consists mainly of conveying flights and scoops which rotate with the kiln. The hot clinker is discharged from the kiln through a screening ring and falls upon a layer of cool clinker resting upon and protecting the grate. As the kiln rotates, the flights and scoops convey the hot clinker toward the outlet end of the grate, spreading the layer at an even thickness over the entire area of the grate. Atmospheric air for cooling the clinker is supplied by means of a fan to various compartments beneath the grate. The air passes through the grate and the layer of clinker,

the air thus being preheated to a high degree, it is claimed, whereas the clinker is rapidly cooled. As the grate is stationary and always protected by a bed of cool clinker, and the other parts of the cooler revolve at a slow speed, the wear and tear is very small, it is claimed.

The preheated air is used for combustion of the fuel in the kiln, the amount entering the kiln being regulated in the usual way by adjusting the kiln damper. If it is desired to cool the clinker to a very low temperature, a small amount of air in excess of that required for the combustion is introduced and in that case this excess air will leave the cooler through a relief stack located in the upper end of the cooler mantle. The air discharged at this point is said to be comparatively cool and the heat loss negligible.

The advantages claimed for the Unax grate cooler are:

Rapid and efficient cooling of the clinker.

Increased fuel economy of the kiln due to the high degree of preheating of the air for combustion through the intimate contact between the clinker and the cooling air.

Increased grindability, and improved quality of the cement, through the rapid cooling of the clinker.

Lower first cost of the kiln installation due to the small head room required for the cooler, reducing the height of the kiln piers and the kiln building.

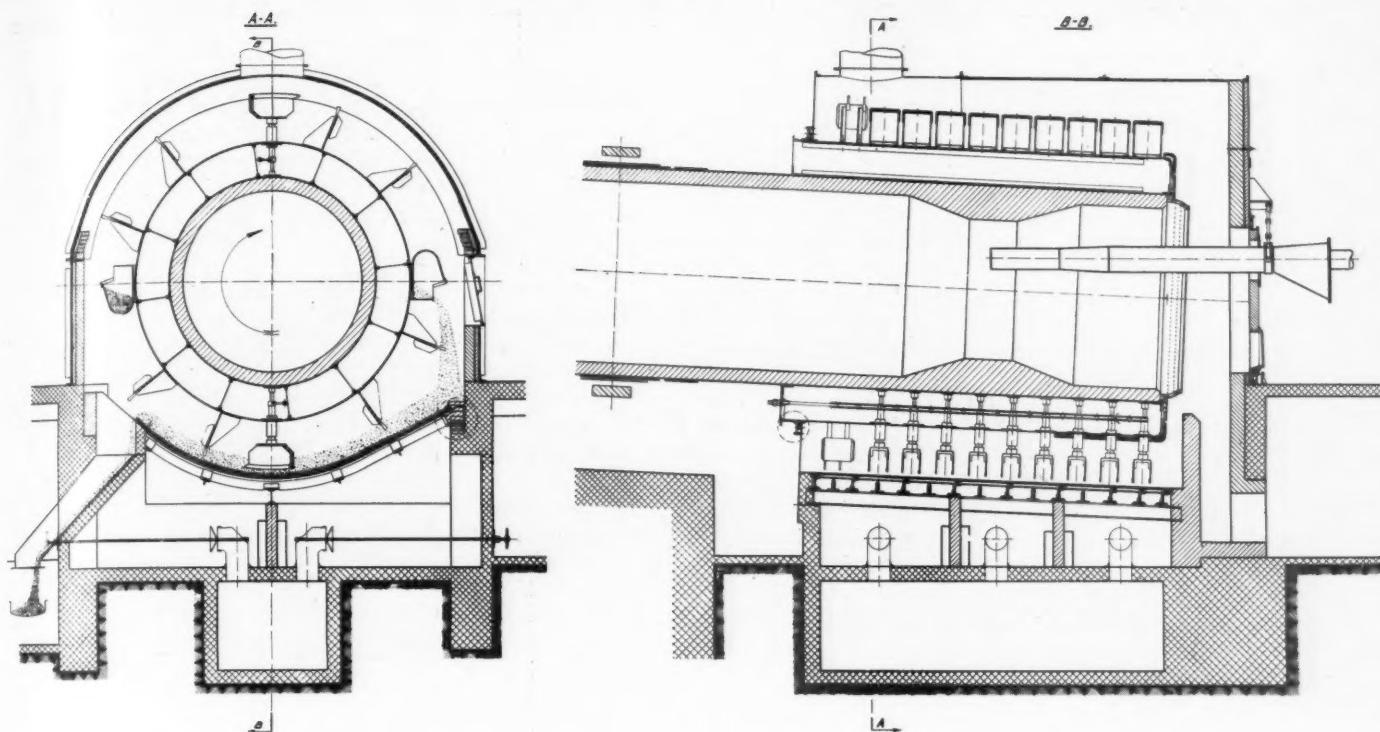
No separate motor required for driving the cooler.

Low maintenance cost due to simplicity in design and slow speed of moving parts.

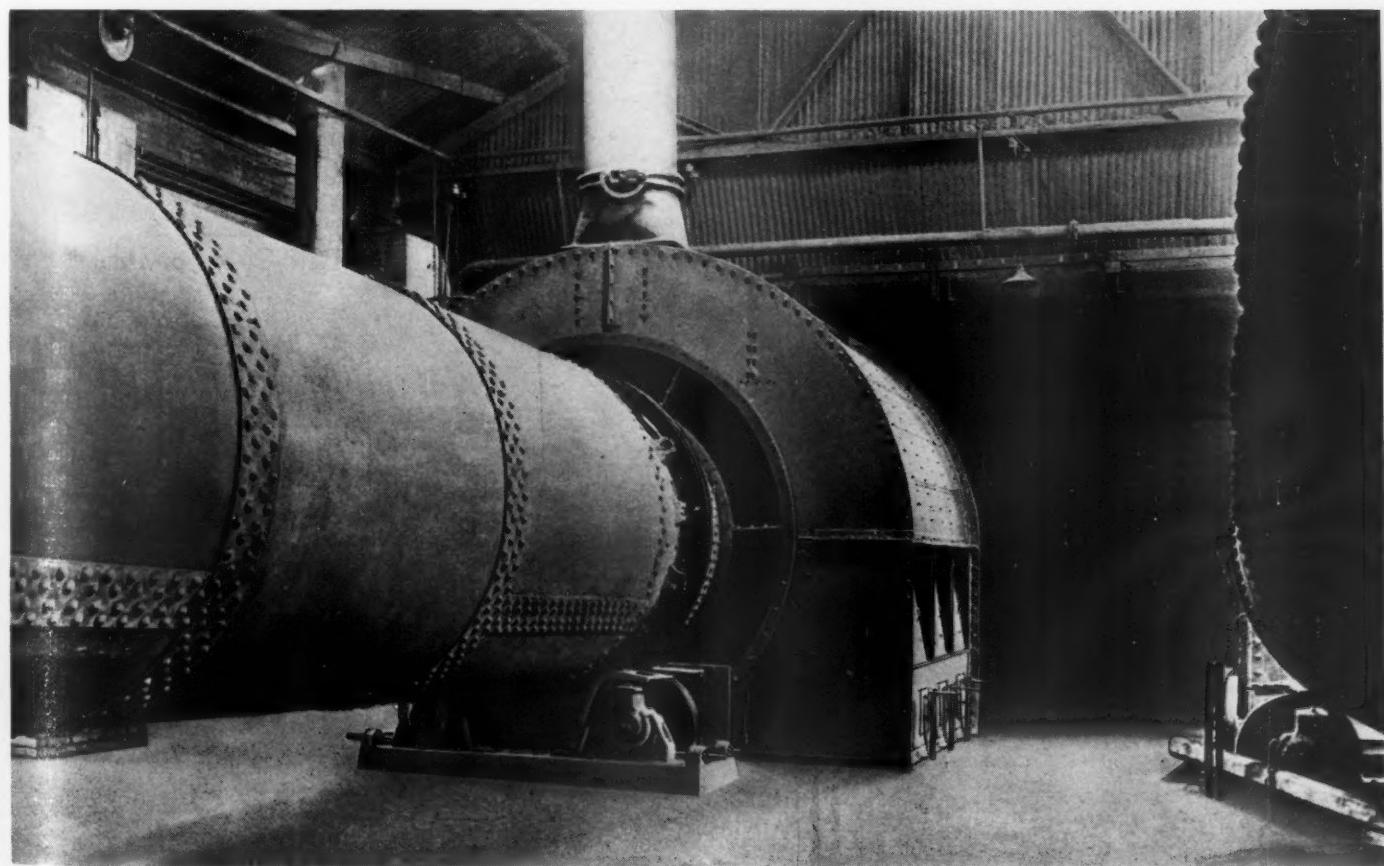
Among the installations of this cooler is included the longest kiln at present operating. This kiln is 512 ft. long, having a capacity of approximately 4000 bbl. per day, and is in operation at the plant of the Tunnel Portland Cement Co., near London, England. Also a new installation at another plant is now being made in connection with a kiln still larger than the above—namely 520 ft. long.

"On the Aqueducts of the Pacific"

ATLAS POWDER CO., Wilmington, Del., has issued a 64-page booklet, 8½ x 11 in., beautifully printed and illustrated, describing the use of explosives in the construction of aqueducts for the Los Angeles, Calif., water supply, and also, more briefly, the Seattle, Wash., Cedar River project; the Portland, Ore., Bull Run project, and the San Francisco, Calif., East Bay project. The booklet is available to contractors and rock products operators on request.



New cement clinker cooler of the air-quenching type

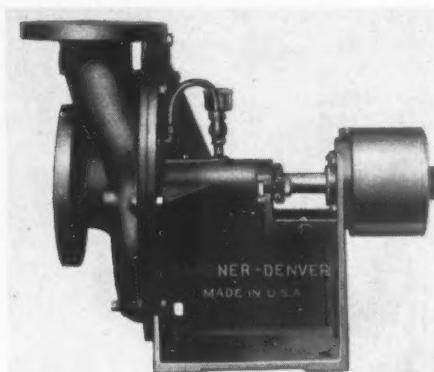


The new clinker cooler installed in a European cement plant

Pumps and Compressors

GARDNER-DENVER CO., Quincy, Ill., announces a new line of side-suction centrifugal pumps (Fig. 1) and a new series of 3-cylinder air compressors (Fig. 2).

The new pumps are known as Type B and C, handling capacities up to 450 g.p.m. at heads up to 100 ft. Only a minimum of machining is done in the impellers, so that the hard outside skin, normal to cast iron, is preserved to give long life, particularly where abrasive materials are handled. Smoothness is obtained by a special foundry

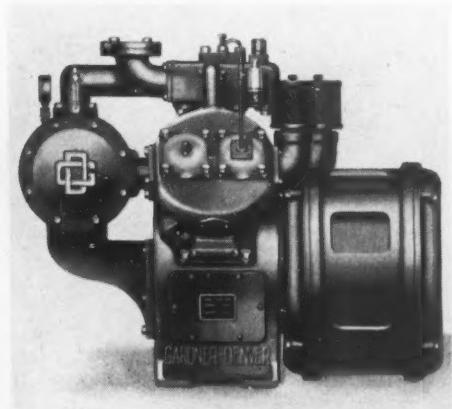


Centrifugal pump

process. The pulley end of the shaft has a ball bearing and the impeller end a sleeve bearing, lubricated by both grease and water. The thrust bearing is adjustable by use of shims to take up wear between impeller and casing, and keep the bearing positively held at all times.

Air Compressors

The 3-cylinder air compressors, known as "WBR" are made in sizes ranging from 113 to 194 c.f.m. displacements. They have two small low pressure cylinders instead of one large one, resulting in lower air temperature; cylinder walls are water-cooled.



Three-cylinder air compressor

Forced feed pressure lubrication is used; pistons and cylinder walls are oil-sprayed by the crank pin. Main bearings are Timken heavy-duty, tapered roller type. There are other special features designed to give strength and quiet operation.

Pump and Dredge Manufacturer

LAWRENCE MACHINE AND PUMP CORP., Lawrence, Mass., has been purchased by Victor J. Mill (better known to the industry as Victor J. Milkowski), formerly of Baldwinsville, N. Y. For the last eight years he has been in charge of engineering and sales (and a director) of the Morris Machine Works; altogether he had been with this concern for 19 years. Mr. Mill has had an extensive experience in the design, testing and installation of pumps and hydraulic dredging plants all over the world, and has been a contributor to ROCK PRODUCTS and other engineering journals. He is a graduate of Sheffield Scientific School, Yale University, and during the World War was a lieutenant of engineers in France.

The company Mr. Mill has taken over was established in 1882, made the first centrifugal pump in this country, and for many years was a leader in its field; at times it shipped between 1000 and 1500 pumps annually. Mr. Mill will resurrect the "Lawrence" line of pumps with improvements. He will also build hydraulic dredges and special machinery. Mr. Mill has many friends among ROCK PRODUCTS readers, to whom his enthusiasm and enterprise as a "live wire" are well known; and they will wish him success in this new venture "on his own."

Clam-Shell Bucket

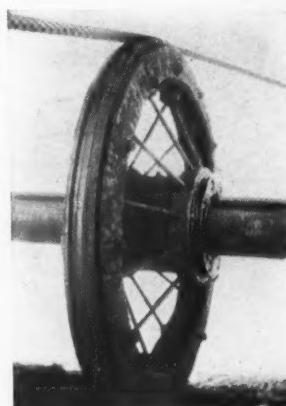
WELLMAN ENGINEERING CO., Cleveland, Ohio, recently designed and built a new type heavy-duty Williams clam-shell. This bucket is of 3½ cu.yd. capacity and weighs over 20,000 lb.; is built of welded alloy steel, normalized for grain structure, heat-treated shafting, alloy steel rivets and manganese steel teeth. It was designed to handle large pieces of rock in breakwater removal and construction and has handled pieces weighing 18 tons.



A 3½-cu. yd. clam-shell

Rubber-Faced Rollers and Sheaves

SMOOTH OPERATION and dependability, resulting in savings on rope and power, with a low maintenance cost, are claimed for the Murray-Cornish rubber-faced rollers and sheaves recently announced by the D. J. Murray Mfg. Co., Wausau, Wis. This equipment is intended for service wher-



Economical roller and sheave

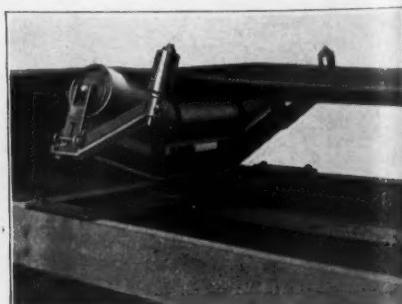
ever wire cable is used, and the sheaves are said to be absolutely noiseless. The sheaves come in standard sizes of 21-in., 30-in. and 48-in. diameter, and are made of cast iron faced with rubber.

Alloy Welding Patent

MORRISON RAILWAY SUPPLY CORP., Buffalo, N. Y., announces that it has been granted patent No. 1,994,479 covering the use of a perfected method of welding alloy steels. Application for patents was made as early as 1931 and the recent grants cover the welding of manganese steel by electric arc in the building up of manganese railroad frogs and crossings, crushers, dipper teeth and other manganese parts. A set-up has been established whereby all welding contractors, railroads and industrials may obtain a license to use this patented process.

Belt Conveyor Idler

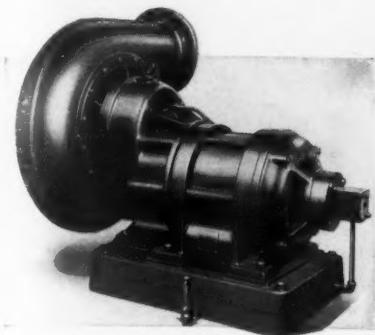
LINK-BELT CO., Chicago, Ill., announces the "Positive" self-aligning, anti-friction idler for troughed conveyor belts. The idler has anti-friction "actuating" rolls near the outside ends of the carrier rolls, at right angles to these, which swivel the idler enough to train the belt when the edge of the belt is so misaligned as to touch either actuating roll. Both actuating rolls and pivot have antifriction bearings.



Self-aligning conveyor belt idler

Seal Clad Motors and Geared-Head Turbo-Blowers

A NEW CENTRIFUGAL COMPRESSOR, making use of a gearmotor, has been announced by Allis-Chalmers Mfg. Co., Milwaukee, Wis. By the use of the gear-



motor, the blower cars run at higher than motor speeds, thereby reducing dimensions. The units are used in foundry cupola blowing, oil and gas fired furnaces, pneumatic conveying, etc.

The company has also introduced a new "seal-clad" squirrel-cage motor, which has permanent coil protection. Hard, smooth bakelite shields are sealed over the stator coils, protecting against metallic dust, grit, oil, moisture, and other agents injurious to insulation.

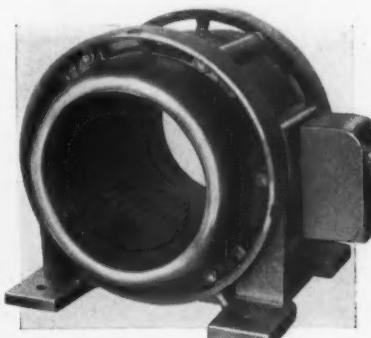
Truck Loader

BARBER-GREENE CO., Aurora, Ill., announces a new loader, Model 82, with improved and exclusive features, among which is a tank-type chassis frame, which eliminates the usual channel frame and cross bracings. Synchronized feeding is another feature claimed; this is accomplished through a special arrangement of the spiral feeding screws. The two crawlers are equipped with "knee action" to keep them always parallel. The design includes a patented floating boom principle, which, it is claimed, lets the crowding thrust go direct from the crawlers to



Truck loader with new features

the feeding end and not through the main frame. A patented overload release sprocket automatically protects the mechanism from



Above: Squirrel-cage motor frame. Left: Centrifugal blower or air compressor

overload. The loader is claimed to have developed a capacity of 3 cu. yd. in 45 sec.

Compensated Belt

MANHATTAN RUBBER MANUFACTURING DIVISION of the Raybestos-Manhattan, Inc., Passaic, N. J., has been granted patents for its "Condor" compensated rubber belt. This patent covers construction details through which, it is claimed, ply stresses are equalized when the belt flexes around a pulley. When a belt passes around a pulley the outside ply, curved on a larger radius than the inside plies, is subjected to greater stress or stretching. The new construction is designed to reduce this stress so that all the belt plies have the same stress, thereby avoiding a tendency for the plies to part, it is claimed.

Oil-Blast Breakers for Panel Mounting

THE OIL BLAST PRINCIPLE of interruption in the new oil-blast breakers for panel mounting recently announced by

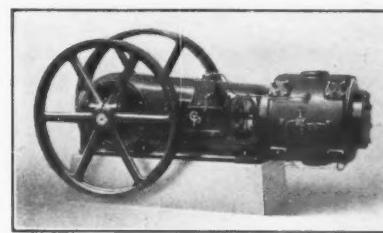


New circuit breaker

the General Electric Co., Schenectady, N. Y., has resulted in a 35% saving in floor space and increased the reliability of operation, according to the company. It is said that maintenance is reduced, that silver-to-silver current-carrying contacts prevent cumulative heating, and that any mounting—such as panels, cubicles, in cells or on pipe work—can be used. The new breakers, designated FK-43, are rated 600 amperes, 15,000 volts; 1200 amperes, 7500 volts; with an interrupting rating of 50,000 kv-a. at the rated voltage.

Air Compressor

CHICAGO PNEUMATIC TOOL CO., New York City, announces a new Type T compressor, which is described as a horizontal, single-stage, double-acting, water-cooled type for belt or direct-connected motor drive for permanent or semi-permanent installations. The salient features include: completely enclosed frame; double row, ad-



New air compressor

justable, tapered roller main bearings; solid, trouble-free crosshead; bored and ground crosshead guides; fork-end, wedge-adjustable connecting rod; double - counterweighted crankshaft; "CP Simplate" valves.

Improved Dust Respirator

PULMOSAN SAFETY APPLIANCE CORP., Brooklyn, N. Y., describes its new M-15 respirator as utilizing a new filter pouch AM-15, which is claimed to give extra high filtering efficiency and low breathing resistance. This filter pouch may be purchased separately, to be attached to present Pulmosan "M" model dust respirators now in service, thus bringing them up to the improved standard of performance.

Publications Received

California Mineral Production and Directory of Mineral Producers; Bulletin 109,200 pp.; State of California, Department of Natural Resources, Division of Mines. Contains summaries of production of various rock products. A list of producers is given by counties.

California Journal of Mines and Geology; State of California, Department of Natural Resources, Division of Mines, July-October, 1933: contains quite a comprehensive report, with maps on the limestone deposits of the San Francisco region, by Edwin C. Eckel, consulting geologist, Washington, D. C.

Digest of Foreign Literature

By F. O. Anderegg, Ph. D.

Consulting Specialist, Long Island City, N. Y.

Strengths from Standard Tests and Concrete Tests. A large number of tests were run with a variety of cements including: aluminous, high early strength portland, standard portland, portlands with siliceous admixtures, natural cements, iron-portlands, and slag cements (Hochofen), working at earth-dry, plastic, soft and pouring consistencies, made into concrete and tested for compressive strengths at 7 and 28 days. In comparison with the results from the German standard mortar tests, made on earth-dry mixes pounded into place, the results of concrete strengths were often badly out of line, indicating that for predicting concrete strengths, standard tests are apt to be misleading. However, it was noted that the higher the standard strengths the higher the ratio between standard and concrete strengths. Wilhelm Stoy, *Beton und Eisen* (1935) 34, No. 2, p. 31.

Rings in Rotary Kilns. The following are the chief causes for the formation of rings in burning portland cement in rotary kilns: (1) A high ash content in the coal, 20% or more leading almost invariably to ring formation. Especially if the ash has a low melting point, trouble is to be expected. (2) Coarse coal favors ring formation markedly. (3) Uneven composition in the raw mix leads to variations in controlling the kiln, with good opportunity for ringing. (4) Too coarsely ground raw mix, especially with large limestone lumps, means localized regions of low melting point. (5) Improper control can, however, be eliminated by selection and training of the burners.

The shape of the kiln is a factor, a widened sintering zone reducing the tendency toward ring formation. The length of the flame must also be considered, the shorter the flame, the greater the opportunity for trouble. Analyses made on ring material indicate three classes: the first with a high SO_3 and alkali content, for which the coal is mostly to be blamed; the second with a high dicalcium silicate content, but with sufficient alumina and iron to prevent dusting; while the third, containing insufficient sesquioxides, dusts on cooling. These two latter can be controlled by proper raw mix with sufficient lime, together with fine and uniform grinding. The first is the most common, and two suggestions are made for controlling it. It might be practicable to add part of the coal to the raw mix, or finely ground limestone might be added to the coal. In the latter case, however, although the excess of the fluxes in the coal might be more or less compensated for, a reduction in flame temperature is to be anticipated, while more of the SO_3 will be caught in the clinker. *Tonindustrie Zeitung* (1935) 59, No. 16, p. 199.

Trass and Free Lime. The increasing interest in this country in "high silica" cements should receive stimulation from a research carried out by Dr. W. Wittekindt of the Dyckerhoff-Wicking works. Using the Konarzewski method of free lime determination, which by replacing the glycerin of the Emley method by phenol facilitates the analysis, experiments were run with portland cement alone and mixed with trass or granulated blast furnace slag, which had been ground to pass a 176-mesh sieve. The specimens were stored in damp air for 16 weeks and then in ordinary air, in water, or 7 days in water followed by air storage. The amount of lime set free in portland cement was greatest when stored in water and reached 13.35% in 40 weeks. In the mix of 70 cement and 30 trass the initial lime was similar to that set free in the straight cement, but this fell off with the time, indicating definite combination between the lime and the active silica of the trass. In the 50-50 mix, nearly as much lime was set free at the start, but this had fallen below 1% in 40 weeks. The slag cements, 70:30 and 40:60 gave similar results.

A variety of trasses, tuffs, brick dust and slags were then mixed with lime and made into specimens. After standing 7 days in air they were stored in water. At intervals samples were removed and the free lime was determined by the phenol method, correcting for any carbonation. In every case a large part of the lime, varying from about $\frac{1}{3}$ to $\frac{2}{3}$ of the original, was brought into combination in 36 weeks. At the same time 1 gram was suspended in 500 of water and thoroughly shaken, filtered, and the lime determined in the filtrate. In 36 weeks the lime leached from the solid was reduced to a small fraction of the original, supporting the free lime determinations. It should be pointed out that strength results do not parallel the combination here noted, probably owing to the physical condition of the silicate formed. *Tonindustrie Zeitung* (1935) 59, No. 11, p. 139.

Studies of Special Portland Cements. Kei-Ichi Akiyama has added chrome and manganese ores to portland cement raw mixes in small amounts and turned for 30 minutes at 1450 deg. C. The clinker was then ground with 3% gypsum, and it was noted that the addition of these two ores improved the sintering of the clinker greatly. Quite good strengths were obtained, and it was found that the cements also had good resistance to sulfuric acid solutions. Using both ores gave better results than with either by itself. *Journal of the Society of Chemical Industry, Japan. Supplemental Binding* (1934) 37, No. 11, p. 646-B.

A Simplified Method of Measuring the Resistance of Concrete Against Aggressive Solutions. Has been proposed by Adalbert Pogangy. He makes small cubes with different cements, aggregate gradings, etc., and immerses them in one, two and three per cent solutions of sulfuric acid. The attack depends upon the opportunity of the acid to contact with the lime in the cement and may be reduced by better grading of the aggregate, more cement, lower water-cement ratio (within limits), etc. Two zinc electrodes cast in the center of the cubes permit polarization potentials to be measured in comparison with those obtained from similar electrodes in the acid alone. The increase in voltage is an indication of the impermeability of the specimen. *Zement* (1934) 23, No. 43, p. 639.

New Specifications for Cement. Prof. Hans Kühl discusses the tendencies in modern cement development and suggests four standard cements: (a) A high early strength cement for reinforced concrete; (b) A paving cement with highest possible flexibility and minimum shrinkage; (c) Cement for mass concrete hardening slowly and developing minimum heat; (d) Aggressive cement to withstand chemical attack. As factors contributing to the desired results, it will be necessary to test for size distribution, setting times, soundness, strength with plastic mortar of a fairly high water-cement ratio, volume change, elasticity, heat evolution, and chemical resistance of the cement. The best method of handling the specifications for the cements is in terms of the compounds formed. *Cement* (1934), 23, No. 15, p. 223.

The Determination of Lime Set Free in Hardened Cement or Cement-Trass Mixtures and of the Combined Lime in Cement-Trass Mixtures. V. Rodt finds that the Emley method of lime determination is not seriously affected by one per cent moisture, provided the phenolphthalein solution in absolute alcohol is about one percent. Applying this method, he found in hardened cements and in mixtures of cements and trass, free lime, but the amount decreased after six months, probably due to carbonation. No evidence was obtained of any combination between lime and trass. In slag-cement, on the other hand, little free lime was to be found, but in mixtures of trass and lime appreciable combination occurs, especially during the first two to four weeks. The amount combined does not differ greatly among different trasses, thereby failing to coincide with the considerable differences in strength observed, so that some other mechanism needs to be sought. *Zement* (1934) No. 23, p. 429.



THE INDUSTRY

New Incorporations

Zephyrhill Rock Co., Zephyrhill, Fla. Incorporators are Geo. G. Crawford and A. A. Gregory.

Keystone Concrete Co., Inc., St. Petersburg, Fla. Incorporators are Louis Poole and J. C. Key.

F. P. Mattera & Son, Inc., Wildwood, N.J.; cement products; \$125,000. The agent is Frank P. Mattera.

John Brill, Inc., Newark, N. J.; cement products; 1000 shares, no par. The agent is Louis H. Hollander.

The Maxwell Blue Stone Co., Inc., Yonkers, N. Y.; quarry; \$10,000. Filed by Bleakley & Harding, 30 S. Broadway, Yonkers.

Manegold Stone Co., Milwaukee, Wis. Increase in stock, providing for 250 shares of fully paid and non-assessable preferred stock at \$100 each.

Rapidan Stone Co., Inc., Richmond, Va.; to deal in stones, clays, sand, gravels or minerals; maximum capital 100 shares without par value. Grover C. Long is president.

Transit Mixed Concrete Corp., Norfolk, Va.; John Twohy II, president. Increased its maximum authorized capital stock from \$10,000 to \$110,000, and rewrote its purposes.

Rockingham Chemical Lime Corp., Linville, Va.; to manufacture and deal in lime and lime products; maximum capital, \$250,000. William Paxton, Harrisonburg, Va., is president.

Seymour Gravel Co., Inc., 109 East Second St., Seymour, Ind.; to deal in gravel and building materials; 100 shares of \$10 par value. Incorporators are William L. Ball, Everett D. Murray and Wilbur C. Baldwin.

Brown-Rosenbarger Gravel Co., Inc., R. R. 3, Box 974, Indianapolis, Ind.; to engage in gravel excavating and to deal in builders' materials; 999 shares, no par value; incorporators are Charles Rosenbarger, 1109 Parker Ave., Indianapolis; Lawrence Henderson; and Herbert Brown.

Personals

John A. Buechler has been appointed superintendent of the Saxon Sand and Gravel Co., Victoria, Texas.

Robert MacFetridge, general manager, Lehigh Portland Cement Co., Birmingham, Ala., was a recent speaker at the Civitan Club.

Jack Watts has been appointed manager of the quarry and crushing plant of Palmer, Woolf and Gray, Winnifield, La., succeeding Mallory Jenkins. Mr. Watts has been connected with local ERA work.

William J. Schenler of the engineering department of the Colorado Fuel and Iron Co., Denver, Colo., has been made chief engineer of the company's mines and quarries, succeeding the late Doyle A. Stout.

A. E. Perry, president, Concho Sand and Gravel Co., Oklahoma City, Okla., is sailing to Europe on June 9 to attend the International Quarrying Conference to be held the week of June 16 at Buxton, Derbyshire, England.

J. G. Munson, president, Michigan Lime-Stone & Chemical Co., Rogers City, Mich., was among the various executive officials of the United States Steel Corp. and its subsidiaries who attended a recent conference in Birmingham, Ala.

N. W. Pickering, president of Farrel-Birmingham Co., Inc., Ansonia, Conn., will return late in June from a two-months' trip to Europe, where he has spent some time with the company's representatives in England, France, Sweden and Norway.

T. H. Wilson, works manager and engineer, Wilson's Portland Cement, Ltd., Auckland, New Zealand, was a recent visitor in ROCK PRODUCTS' office. He has been in this country for several months studying recent developments in American cement manufacture.

Guy A. Patterson, for two years sales manager of the Wyandotte Coal and Lime Co., Kansas City, Mo., and before that as assistant sales manager for the Lone Star Cement Co., Kansas, has been appointed Kansas City sales representative for the Consolidated Cement Corp., which has plants at Fredonia and Mildred, Kan.

Obituaries

Manuel de Meo, foreman, Goodwin-Gallagher Sand Co., Port Washington, L. I., was killed in an accident at the plant April 29 when he fell through a chute into a wet sand pile.

Alfred I. duPont, 72, former president of E. I. duPont de Nemours & Co., died at his Florida estate on April 29.

Thomas P. Meadows, one of the organizers of the International Agricultural Corp. and a native of the phosphate rock section of Tennessee, died in New York May 6. He was the president and organizer of the American Potash Corp., which attempted to build a plant during the war at New Brunswick, N. J., to make potash from green sand. The part of the plant completed was subsequently taken over by the Metropolitan Cement Co., with which he had been connected more recently.

W. G. Banks, 57, supervising chemist in Colorado, Utah and Montana, died at his home in Fort Collins, Colo., April 25. A widow and two children survive.

Lorenzo H. Zambrano, president of Cementos Mexicanos, S. A., Monterrey, N. L., Mexico, died recently. He had long been active in the highway construction and quarry industries and was a leading promoter of the Pan-American highway project from Laredo, Texas, to Mexico City.

John Keese Hallock, former assistant sales manager, Pittsburgh, of the Universal Atlas Cement Co., died May 24. Mr. Hallock joined the organization in 1908 and successively became salesman, assistant sales agent, division sales manager and assistant sales manager. In 1933 he was made special representative of the company, and he held this position at the time of his death.

Crushed Stone

Marceline, Mo., city authorities have opened a rock quarry for local road work.

Chetopa, Kan.: Labette county commissioners have installed a portable crushing plant.

Moberly, Mo.: Randolph county court will purchase a rock crusher to produce road material.

Brome & Enders, Greybull, Wyo., have opened a quarry near Bridger, Mont., for highway stone.

Highland, Kan., city authorities have purchased a portable rock crushing plant for street material.

Chariton, Iowa: Lucas county has installed a rock crusher at the quarry northeast of the town.

La Crosse, Wis., county commissioners have begun operation of the Krueger quarry for highway stone.

Mineral Point, Wis., city authorities have opened stone quarry on the Darlington road for city paving material.

Lawrenceburg, Ky.: Anderson county recently purchased a new portable crushing plant for local highway work.

Spring Hill, Kan., county board has purchased a portable rock crusher for supplying material for township roads.

Portland, Ore.: Multnomah county recently received bids on a rock crushing plant to cost approximately \$20,000.

Colorado Fuel & Iron Co., Pueblo, Colo., has resumed operation of its quarry at Monarch, Colo., to supply flux stone.

Butler, Ala.: Choctaw county highway authorities are planning to establish a crushing plant to be operated by convicts.

Bern, Kan.: Nemaha county commissioners have leased a quarry on the Fred Lehman farm to produce stone for local highway.

Elk City, Kan.: Elk county commissioners have installed a rock crusher on the Holden farm to produce stone for local road work.

Shelby, N. C., has purchased a portable crushing plant, air compressor, drills and trucks to produce crushed stone for city streets.

Waterloo, Iowa, board of supervisors will open a quarry east of Raymond to provide 2500 cu. yd. of crushed stone for local highways.

R. K. McDonald, Stevens Point, Wis., has opened a sandstone quarry on St. Louis avenue to supply building and flag stone.

Everett, Wash.: Snohomish county commissioners are opening a rock quarry near Trafton to supply material for highway surfacing.

W. T. Johnson, Herndon, Kan., contractor, has established a crushing plant southwest of the town to supply stone for local highway projects.

Hoelzel Construction Co. has leased quarry on the Chris. Harra farm at Independence, Mo., for stone for revetment work on the Missouri river.

Riverside, Iowa: State highway commission has purchased a rock quarry on the Edward Winger farm to quarry rock for surfacing Highway 22.

Kansas City, Kan., has leased a tract of land west of the City park from the county to open a quarry for rock to be used on the Jersey creek project.

Kingston, Mo.: Grant township has established a portable crushing plant on the George Early farm south of town to produce material for local highways.

Fort Madison, Iowa: Lee county commissioners have located a quarry in Marion township to produce stone for county roads. They have purchased two crushing plants.

Halvorson Bros., Elgin, Minn., have contracted with the county commissioners to operate three crushing plants to supply stone for highway purposes and also pulverized limestone to farmers.

C. & R. Engineering Co., Richmond, Mo., has reopened its quarry on the Fowler farm to supply an order from the state highway department for resurfacing Highway 13 from Richmond to Polo. J. F. Rhodes is in charge.

Ottumwa, Iowa: Wapello county is developing the capacity of its rock quarry and gravel pit. Equipment recently added includes a 7-ton locomotive and 8 side-dump cars, which, it is reported, were purchased second-hand for \$600.

Seneca, Kan.: Nemaha county commissioners recently purchased a second portable crushing plant from the Austin-Western Road Machinery Co., and it is now being operated at the Mills quarry in southeast Red Vermillion township.

Casper Stolle Quarry & Contracting Co., East St. Louis, Ill., recently blasted a 700-ft. stretch of limestone ledge 100 ft. high with a single charge of 32 tons of explosive. The Rev. James B. Macelwane of the department of geophysics at St. Louis University took advantage of the blast to study earth vibration with the seismograph.

Scarlet Stone Co., Pipestone, Minn., has been dismantled and the machinery shipped to Dresser Junction, Wis. The quarry has been a shipper of crushed stone since 1919. The stone was at one time much in demand for red roofing granules. At Dresser Junction, it is said, the machinery will be reassembled to manufacture green roofing granules. The present owner is J. B. Preston Co., New York City.

Lime

Calhoun Lime Co., St. Matthews, S. C., is reported considering installing additional equipment. B. E. Bensen is president.

Gypsum

United States Gypsum Co. has moved its New York office to the 44th floor of the RCA building, Rockefeller Center.

Sand and Gravel

Wyoming Sand & Stone Co., Scranton, Penn., announces the removal of its office to 617 Connell building.

Becker County-Shiel Co., Glasgow, Mont., was honored May 19 by a visit from the directors of the Northern Pacific railroad, including the president and vice-president in charge of operation.

St. Louis, Mo.: Fourteen firms producing and dealing in sand and gravel and other building materials were issued a temporary restraining order May 1 against 18 representatives of labor unions, preventing these from interfering with operations.

Pioneer Sand & Gravel Co., Seattle, Wash., in connection with its exhibit at the Home-builders' exposition, held a guessing contest on the number of pieces of gravel in a glass barrel, for which a prize of \$50 was offered for the nearest guess. The correct number of pieces was 6241, and three contestants were awarded the \$50 prizes; two guessed 6242, and one guessed 6240. The prize was payable in building material.

Hallett Construction Co., Winona, Minn., has started operation of its Hager City and Trempealeau pits to supply sand and gravel to the Winona and Trempealeau dam jobs on the Mississippi river.

Walla Walla, Wash., has borrowed the county rock crusher and proposes to produce crushed river gravel for street work.

Zimmerman & Hand, contractors, Wichita, Kan., have opened a sand pit on the McFarland property seven miles south of Newton, Kan., to supply material for highway work.

Cement

Colorado Portland Cement Co., Florence, Colo., recently resumed production on a 2,000-bbl.-a-day basis.

Lehigh Portland Cement Co. resumed operation at its Oglesby, Ill., plant on May 10. John Young is superintendent.

Ash Grove Lime and Portland Cement Co., Chanute, Kan., resumed operation April 16 following a shutdown of two months.

Lehigh Portland Cement Co. resumed operation of its Mason City, Iowa, plant May 20. W. H. Patterson is superintendent.

Canada Cement Co., Ltd., reopened its Fort Whyte plant near Winnipeg early in May after a shutdown of several months.

Lehigh Portland Cement Co., Metaline Falls, Wash., is constructing new storage and blending bins preparatory to shipping on government orders.

Lone Star Cement Co., Indiana, resumed operations May 1 at Limerdale, Ind., after a shutdown of several months. C. Erdman is superintendent.

Medusa Portland Cement Co., Cleveland, Ohio, resumed operation of its Dixon, Ill., plant on May 1 after a seven-months' shutdown. L. E. Smith is superintendent.

Miscellaneous

Concrete pipe for culvert purposes has been manufactured as an FERA project during the last few months at Jefferson, Ohio.

Big Rock Stone and Construction Co., Little Rock, Ark., suffered slight damages recently, when fire broke out in its asphalt plant in North Little Rock.

Manufacturers

Sullivan Machinery Co., Chicago, Ill., has moved its offices from the Wrigley Building to the Bell Building, 307 North Michigan Ave.

Service Supply Corp. and Rental Service Co., Inc., Philadelphia, Penn., have opened a branch warehouse, display room and office at 15th and Mayflower Sts., Harrisburg, Penn.

Hercules Motors Corp., Canton, Ohio, announces the removal of its West Coast representative's office from San Francisco, Calif., to Room 523 Transamerica Bldg., Los Angeles, Calif. Oliver Kelly is the West Coast direct factory representative.

Blaw-Knox Co., Pittsburgh, Penn., has consolidated its several departments marketing construction equipment into a construction equipment division, which will handle more adequately the expected demand from the public works program.

T. A. Canty, Baltimore, Md., distributor of arc welding equipment and supplies manufactured by **The Lincoln Electric Co.**, Cleveland, Ohio, has found it necessary, due to increased business, to move from 116 East Centre St. to larger quarters at 1023 Cathedral St.

Link-Belt Co., Chicago, Ill., announces the appointment of **Construction Equipment Co.**, 2274 Main St., Hartford, Conn., as authorized distributors of Link-Belt crawler-mounted shovels, cranes, draglines, and track-type locomotive cranes. George L. Kaeser is president of the Hartford company.

Morse Chain Co., Ithaca, N. Y., at a meeting of its board of directors, recently elected D. B. Perry, president; C. J. Kenerson, vice-president, general manager and treasurer; N. K. Van Osdol, secretary and assistant general manager; S. B. Waring, assistant secretary and assistant treasurer. Frank M. Hawley was appointed sales manager of the automotive division and manager of the Detroit plant.

The Brown Instrument Co., Philadelphia, Penn., and Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., have opened a joint office in the 101 Marietta St. Building, Atlanta, Ga., to serve the southeast. Wesley R. Moore, for a number of years district manager of Brown Instrument Co., is manager in charge, with Leon L. Kuempel, sales engineer, Charles A. Kitzinger, service engineer, and J. A. Crawley, office manager.

Baldwin Locomotive Works, Philadelphia, Penn., has appointed Messrs. Carr Brothers, Inc., of New York, its exclusive agent for the Republic of Mexico. P. G. Cheatham of Mexico City is the representative.

Bucyrus-Erie Co., South Milwaukee, Wis., announces the appointment of F. C. Crane Co., 1301 S. Lamar St., Dallas, Texas, as distributor of power shovels, draglines, cranes, clamshells and skimmer scoops in central and eastern Texas.

Smith-Emery Co., chemists and engineers, Los Angeles, Calif., is celebrating its twenty-fifth anniversary this year. Established in 1910 with a staff of only four members, the firm has gradually enlarged to its present size. It built a commercially successful potash plant during the war. It has representatives at San Francisco, Calif., Portland, Ore., and Seattle, Wash., and is associated with the Pittsburgh Testing Laboratory, which has offices in eastern and southern states.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Penn., has elected L. W. Lyons as treasurer, to succeed former Treasurer Herman F. Baetz, who is retiring from active duty. Mr. Lyons joined the Westinghouse organization in 1904 and has been continuously with its credit department ever since. The company also announces the appointment of H. F. Boe as assistant eastern district manager, with headquarters at Rockefeller Center, New York City. Mr. Boe has been with the company since 1901 except for one two-year period; he was manager of the Buffalo district at the time of his promotion.

Worthington Pump and Machinery Corp., Harrison, N. J., announces the election to its board of directors of Albert C. Bruce, president of the United States Hoffman Machinery Corp. Mr. Bruce is also a director of the Baltimore National Bank and Central Savings Bank of Baltimore and a member of the reorganization committee of the Symington and Gould Coupler companies. The company also announces the appointment of J. E. Holveck as special sales engineer, operating from Pittsburgh but extending his activities to the territories of the Cleveland, Detroit, Chicago and Buffalo offices. Mr. Holveck was formerly a member of the engineering staff of Worthington's Holyoke works and later was associated with Aldrich Pump Co. as sales engineer in its Pittsburgh district.

Trade Literature

Electrodes. Booklet No. 2, 16 pages, illustrated, gives complete data on Murex heavy mineral coated electrodes for welding. METAL & THERMIT CORP., New York, N. Y.

Stokers. Folders 1458 and 1459 contain data on underfeed screw type stokers in sizes up to 300 B.H.P. LINK-BELT CO., Chicago, Ill.

Screens. High capacity and low cost operation are featured in a circular illustrating the Tyler-Niagara screen. THE W. S. TYLER CO., Cleveland, Ohio.

Calcinators. Sales of "Miag" calcinators in eight countries during 1933-1934 are listed in a 4-page folder. BRADLEY PULVERIZER CO., Allentown, Penn.

Trailers. A circular illustrates and features the new $\frac{3}{8}$ -yd. "10-B" as strong, speedy, and easily controlled. BUCYRUS-ERIE CO., South Milwaukee, Wis.

Rubber Belts. Fourteen different improvements in belt construction are listed with photographs in a large colored folder. B. F. GOODRICH CO., Akron, Ohio.

Balancers. "Thor Perfect Balancer." In capacities up to 200 lb., with tapered drum, is described in a circular. INDEPENDENT PNEUMATIC TOOL CO., Chicago, Ill.

Grinding Mills. Bulletin 1103, 36 pages, illustrates and describes ball and rod mills and their various attachments. TRAYLOR ENGINEERING & MANUFACTURING CO., Allentown, Penn.

Wire Cloth. A 4-page folder illustrates and gives data, including prices, on typical weaves and meshes, sieves, filter cloth, and strainers. NEWARK WIRE CLOTH CO., Newark, N. J.

Air Circuit Breakers. GEA-1662A is a colored 4-page circular illustrating the advantages of the AL-2 trip-free air circuit breaker. GENERAL ELECTRIC CO., Schenectady, N. Y.

Safety Equipment. Goggles, lamps, respirators, safety belts and other safety appliances are described and illustrated in an 8-page booklet. MINE SAFETY APPLIANCES CO., Pittsburgh, Penn.

Buckets. Bulletin 300 is a small, 24-page index of all types of Hayward digging and rehandling buckets and shows their application to various kinds of work. HAYWARD CO., New York, N. Y.

Pneumatic Tools. Catalog 50 illustrates pneumatic tools manufactured under the trademark "Thor." Specifications are included. INDEPENDENT PNEUMATIC TOOL CO., Chicago, Ill.

Pulsators. Bulletin No. 066-J of 8 pages illustrates and describes in detail the new pulsator, complete with tables of capacities and specifications. SMITH ENGINEERING WORKS, Milwaukee, Wis.

Chain Drives. A silent chain drive, named "Silverstreak," is presented in a 32-page book, No. 1425, showing many types of applications on both long and short centers. LINK-BELT CO., Chicago, Ill.

Insulation. A light, plastic insulation of large covering capacity, which can be applied to all types of heated surfaces, is described in a circular. WYO-LITE INSULATION PRODUCTS, Cleveland, Ohio.

Switches. Outdoor, drop-out, fuse disconnecting switch, type EF-2, is described in a 4-page leaflet. G-E knife switches, types LP-1 and LP-Y1, are taken up in an 8-page leaflet. GENERAL ELECTRIC CO., Schenectady, N. Y.

Patcher. A portable pugmill patcher for bituminous road repairs is discussed in a folder. The "why" of the pugmill is explained, and specifications are included. BITUMINOUS ROAD MACHINERY CO., Wayne, Penn.

Pyrometers. "Pyro," a new surface pyrometer, with which contact and reading of actual temperatures no longer have to be made simultaneously, is the subject of Bulletin No. 60. THE PYROMETER INSTRUMENT CO., New York, N. Y.

Cranes and Hoists. Bulletin C-27 is a résumé of the accuracy of control and low costs involved in the use of air powered cranes and hoists for light and medium capacity work. CURTIS PNEUMATIC MACHINERY CO., St. Louis, Mo.

Cranes. Bulletin No. 45 of 12 pages illustrates and gives applications of the Krane Car and Krane Krawler including dimension blueprints, capacity diagrams and complete specifications. SILENT HOIST WINCH AND CRANE CO., Brooklyn, N. Y.

Drills. A broadside describes the versatility of the Cleveland Universal Drill Rig, which drills ten o'clock holes or ordinary six o'clock holes or any other angle or direction. Blue-print diagrams show features of its operation. CLEVELAND ROCK DRILL CO., Cleveland, Ohio.

Pumps. "Monobloc" centrifugal pumps, "the ideal standard for the small pump user," is the subject of folder W-321-B2A. Type TB horizontal duplex piston pumps, turret style, for general services, are discussed in folder W-102-B1. WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Recorder Numerals. Reading of multiple-point instrument records is simplified by a new system of "numerals in colors" which is described in a six-color leaflet. The colored numerals can be specified on Micromax strip chart recorders. LEEDS & NORTHRUP CO., Philadelphia, Penn.

Lindwelding. A film entitled "The Multiflame Lindwelding Head" is now available for school and industrial showings, illustrating this new method of pipe-line welding. The film is available in the 16-mm. size and will be furnished free of charge for showings. LINDE AIR PRODUCTS CO., New York, N. Y.

Chains, Sprockets, Buckets. Bulletin No. 74, illustrating standard types of chains, with weights, dimensions, working loads and prices given for each size. Desirable information is included on sizes, prices, etc., of shafting, collars, takeups, buckets and gears. C. O. BARTLETT AND SNOW CO., Cleveland, Ohio.

Mills. The Hardinge-Hadsel mill, which has undergone development during the past four years, is featured in Bulletin Ah-323. The Kootenay-Belle mine and mill installation in British Columbia is described. Cost data, showing the economy of the Hardinge-Hadsel mill, are included. HARDINGE CO., INC., York, Penn.

Bucket Elevators. This 111-page illustrated catalog, No. 565, contains complete list of prices and specifications on the complete line of elevators carried by the company. Contains information on the design, application, operation of bucket elevators, and hints to assist in the selection of an elevator to meet given requirements. JEFFREY MANUFACTURING CO., Columbus, Ohio.



STILL HARD AT WORK

THREE o'clock in the morning. Every workman home in bed—getting rested for tomorrow's work.

But *non-preformed* wire rope has to work *all* the time, without rest. Even when it's idly hanging from a boom it works . . . works against itself. It can *never* rest—because every wire and every strand is under tension. Every wire and every strand is forced into a position it resists—every wire and strand is pushing and pulling against every other one—constantly trying to release itself from its twist. Scientists estimate that this ceaseless effort wastes an appreciable per-



centage of the wire rope's useful energy.

It is this condition which the preforming process corrects. It is the preforming that frees the wires and strands in "Lay-Set" from internal stress and strain . . . makes Lay-Set Preformed Wire Rope superior to *non-preformed* wire rope. Being preformed Lay-Set is easier to install—easier to splice or socket—resists kinking, almost refuses to "high and low strand"—gives greatly increased service—reduces operating costs.

Send for a sample of Lay-Set Preformed Wire Rope and prove to yourself the truth of these statements. Sign and return the coupon.

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Denver Los Angeles San Francisco Philadelphia
Fort Worth Tacoma



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Wilkes-Barre, Pennsylvania

Send me a sample length of LAY-SET Preformed wire rope and a copy of your book "12 Burning Questions." No obligation, of course.

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PREFORMING IS A PATENTED MANUFACTURING PROCESS APPLICABLE TO ANY TYPE, GRADE, CONSTRUCTION AND LAY OF WIRE ROPE

Classified Directory of Advertisers in this Issue of Rock Products

For alphabetical index, see page 2

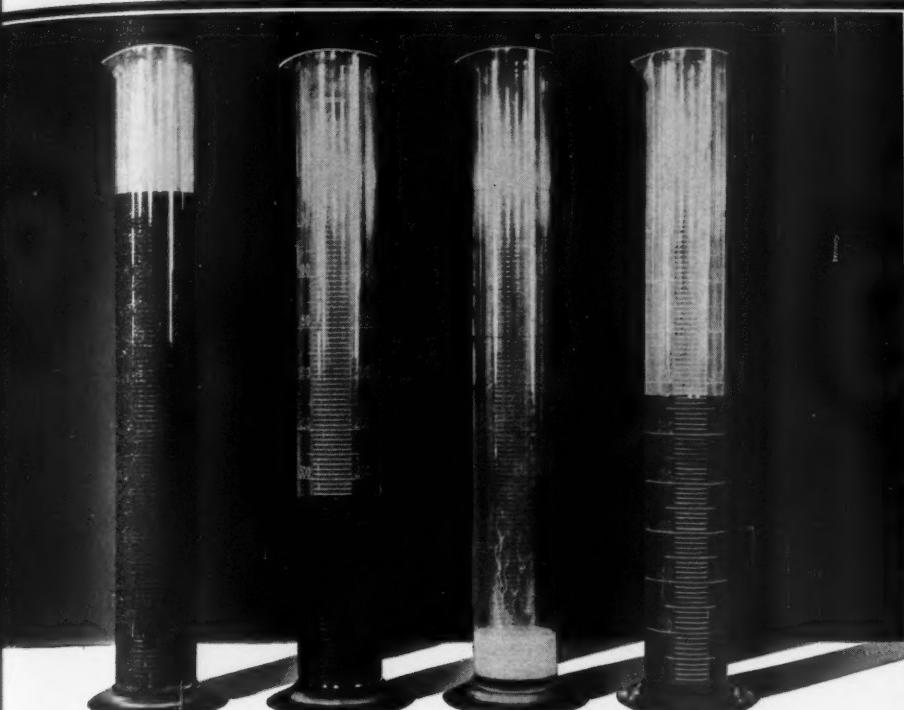
This classified directory of advertisers in this issue is published as an aid to the reader. Every care is taken to make it accurate, but ROCK PRODUCTS assumes no responsibility for errors or omissions. The publishers will appreciate receiving notice of omissions or errors, or suggestions.

Acetylene Welding Rod American Steel & Wire Co.	Belting (Transmission) B. F. Goodrich Co.	Caps (Blasting) Atlas Powder Co. E. I. du Pont de Nemours & Co., Inc. Hercules Powder Co.	Conveyor Idlers and Rolls Barber-Greene Co. Chain Belt Co. Link-Belt Co. Robins Conveying Belt Co.
Agitators, Thickeners and Slurry Mixers F. L. Smith & Co.	Bin-Dicator Ripley Mfg. Co.	Car Pullers Link-Belt Co. Robins Conveying Belt Co.	Conveyors and Elevators Earle C. Bacon, Inc. Barber-Greene Co. Chain Belt Co. Fuller Company Industrial Brownhoist Corp. Lewistown Fdy. & Mach. Co. Link-Belt Co. Pioneer Gravel Equip't. Mfg. Co. Robins Conveying Belt Co. F. L. Smith & Co. Smith Engineering Works Traylor Eng. & Mfg. Co. Universal Road Machy. Co. Williams Patent Crusher & Pulv. Co.
Air Compressors Curtis Pneumatic Machy. Co. Fuller Co. Gardner-Denver Co. Nordberg Mfg. Co. Traylor Eng. & Mfg. Co. Worthington Pump & Machy. Corp.	Bin Gates Chain Belt Co. Fuller Co. Industrial Brownhoist Corp. Link-Belt Co. Robins Conveying Belt Co. Traylor Eng. & Mfg. Co. Universal Road Machy. Co.	Carriers Barber-Greene Co.	Conveyowers Richardson Scale Co.
Air Filters Fuller Co.	Bins Pioneer Gravel Equip't. Mfg. Co. Traylor Eng. & Mfg. Co. Universal Road Machy. Co.	Cars (Dump) Lorain Steel Co.	Conveyors (Pneumatic) Fuller Company
Air Hoists Curtis Pneumatic Machy. Co.	Blasting Cap Protectors B. F. Goodrich Company	Cars (Quarry and Gravel Pit) Lorain Steel Co.	Conveyors (Screw) Link-Belt Co.
Air Pumps Worthington Pump & Machy. Corp.	Blasting Machines Atlas Powder Co. E. I. du Pont de Nemours & Co., Inc. Hercules Powder Co.	Castings Eagle Iron Works (Grey Iron) Link-Belt Co. Timken Roller Bearing Co.	Coolers (See Kilns and Coolers, Rotary) Fuller Co. F. L. Smith & Co.
Air Separators Bradley Pulverizer Co. Raymond Bros. Impact Pulv. Co. Universal Road Machy. Co. Williams Patent Crusher & Pulv. Co.	Blasting Powder (See Powder, Blasting)	Cement Making Machinery F. L. Smith & Co.	Correcting Basins F. L. Smith & Co.
Air Tool Hose Worthington Pump & Machy. Corp.	Blasting Supplies Atlas Powder Co. E. I. du Pont de Nemours & Co., Inc. Hercules Powder Co.	Cement Process Cement Process Corp.	Couplings (Flexible and Shaft) Chain Belt Co. Link-Belt Co.
Armorite (for Chute Lining) B. F. Goodrich Company	Blocks (Pillow, Roller Bearing) Link-Belt Co. S K F Industries, Inc. Timken Roller Bearing Co.	Cement Pumps Fuller Co. F. L. Smith & Co.	Couplings (Hose, Pipe, etc.) B. F. Goodrich Company United States Rubber Co.
Automatic Weighers Richardson Scale Co.	Blocks (Sieve) American Manganese Steel Co.	Central Mixing Plants (Concrete) Chain Belt Co.	Cranes (Air Powered) Curtis Pneumatic Machy. Co.
Babbitt Metal Joseph T. Ryerson & Son, Inc.	Boilers Combustion Engineering Corp.	Chain (Dredge and Steam Shovel) Bucyrus-Erie Co.	Cranes (Clamshell) Bucyrus-Erie Co. Harnischfeger Corp. Koehring Co., Division of National Equip't. Corp.
Backdiggers Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)	Boots and Shoes B. F. Goodrich Company United States Rubber Co.	Chain (Elevating and Conveying) American Manganese Steel Co. Chain Belt Co. Link-Belt Co.	Cranes (Crawler and Locomotive) Bucyrus-Erie Co. Harnischfeger Corp. Industrial Brownhoist Corp. Koehring Co., Division of National Equip't. Corp. Lima Locomotive Works, Inc. (Ohio Power Shovel Co.) Link-Belt Co.
Backfillers Bucyrus-Erie Company Harnischfeger Corp. Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)	Breakers (Primary) Smith Engineering Works Williams Patent Crusher & Pulv. Co.	Chain Drives Chain Belt Co.	Cranes (Excavator) Koehring Co., Division of National Equip't. Corp.
Bagging Machinery Richardson Scale Co.	Buckets (Dragline and Slack-line) American Manganese Steel Co. Bucyrus-Erie Co. Pioneer Gravel Equip't. Mfg. Co.	Chain Systems (Kilns) F. L. Smith & Co.	Cranes (Gantry) Industrial Brownhoist Corp.
Ball Bearings S K F Industries, Inc.	Buckets (Dredging and Excavating) Harnischfeger Corp.	Chutes and Chute Liners American Manganese Steel Co. Cross Engineering Co.	Cranes (Overhead Traveling Electric) Harnischfeger Corp. Industrial Brownhoist Corp.
Balls (Grinding, See Grinding Balls)	Buckets (Elevator and Conveyor) Chain Belt Co. Cross Engineering Co. Hendrick Mfg. Co. Industrial Brownhoist Corp. Link-Belt Co. Pioneer Gravel Equip't. Mfg. Co.	Chutes for Minimizing Segregation Robins Conveying Belt Co.	Crusher Parts American Manganese Steel Co. Pennsylvania Crusher Co.
Balls (Tube Mill, etc.) Allis-Chalmers Mfg. Co. Lorain Steel Co. F. L. Smith & Co.	Buckets (Clamshell, Grab, Orange Peel, etc.) Harnischfeger Corp. Hayward Company Industrial Brownhoist Corp. Link-Belt Co.	Classifiers Link-Belt Co.	Crushers (Hammer) Dixie Machy. Mfg. Co. Pennsylvania Crusher Co. Lorain Steel Co. Williams Patent Crusher & Pulv. Co.
Bar Benders and Cutters Koehring Co., Division of National Equipment Corp.	Bulldozers Koehring Co., Division of National Equipment Corp.	Clay Working Machinery Bonnot Company	Crushers (Jaw and Gyratory) Allis-Chalmers Mfg. Co. Earle C. Bacon, Inc. (Jaw) Good Roads Machy. Corp. (Jaw) Lewistown Fdy. & Mach. Co. New Holland Machine Co. Nordberg Mfg. Co. Pennsylvania Crusher Co. Pioneer Gravel Equip't. Mfg. Co.
Batchers Fuller Company	Cableways American Steel & Wire Co. Link-Belt Co.	Compressed Air Hoists Gardner-Denver Co.	Crushers (Jaw) Smith Engineering Works Traylor Eng. & Mfg. Co. Universal Road Machy. Co. Williams Patent Crusher & Pulv. Co.
Bearings Chain Belt Co. Link-Belt Co. Joseph T. Ryerson & Son, Inc. S K F Industries, Inc. Timken Roller Bearing Co.	Calciners John A. Roebling's Sons Co. Williamsport Wire Rope Co.	Compressed Air Compressors Gardner-Denver Co.	Crushers (Gyratory) Allis-Chalmers Mfg. Co. Earle C. Bacon, Inc. (Jaw) Good Roads Machy. Corp. (Jaw) Lewistown Fdy. & Mach. Co. New Holland Machine Co. Nordberg Mfg. Co. Pennsylvania Crusher Co. Pioneer Gravel Equip't. Mfg. Co.
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Bearings (Tapered Roller) Timken Roller Bearing Co.	Cap Crimpers and Fuse Cutters Ensign-Bickford Co.	Condensers Worthington Pump & Machy. Corp.	Crushers (Mud-Jack) Koehring Co., Division of National Equipment Corp.
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new

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Refined by Gulf's Multi-Sol Process

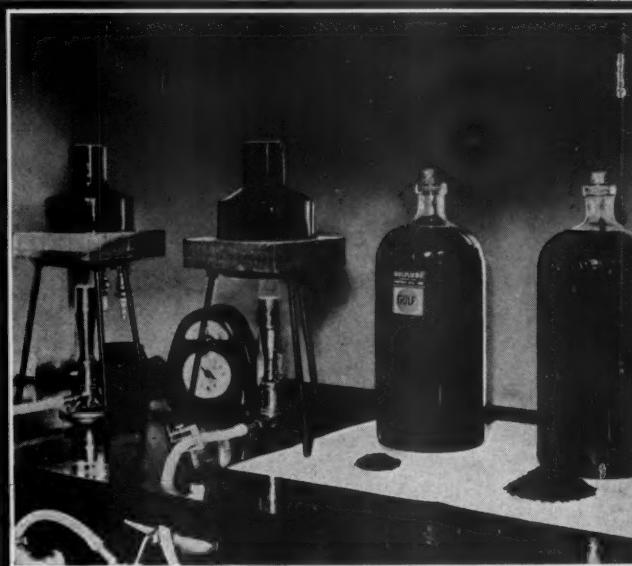


Above is a sample of the original charge of lubricating stock as it goes to the Multi-Sol plant.

Here is the quantity of carbon and sludge forming impurities removed by the Multi-Sol process.

The third test tube contains the solid paraffin wax removed by this efficient refining process.

Above is shown the quantity of the pure Gulflube Motor Oil after dewaxing, filtering, etc., secured from the original lubricating stock fractionated from the crude.



The photograph above shows the quantity of carbon that is removed by the Conradson carbon residue test when applied to a gallon of the new Gulflube Motor Oil and a gallon of another widely distributed brand of motor oil.

FLEET OPERATORS CAN NOW USE A PREMIUM QUALITY OIL WITHOUT PAYING PREMIUM PRICE

"The new Gulflube is the only motor oil made by this process and sold at 25c per quart at service stations."

NOW truck and commercial car operators can afford to use a premium quality motor oil!

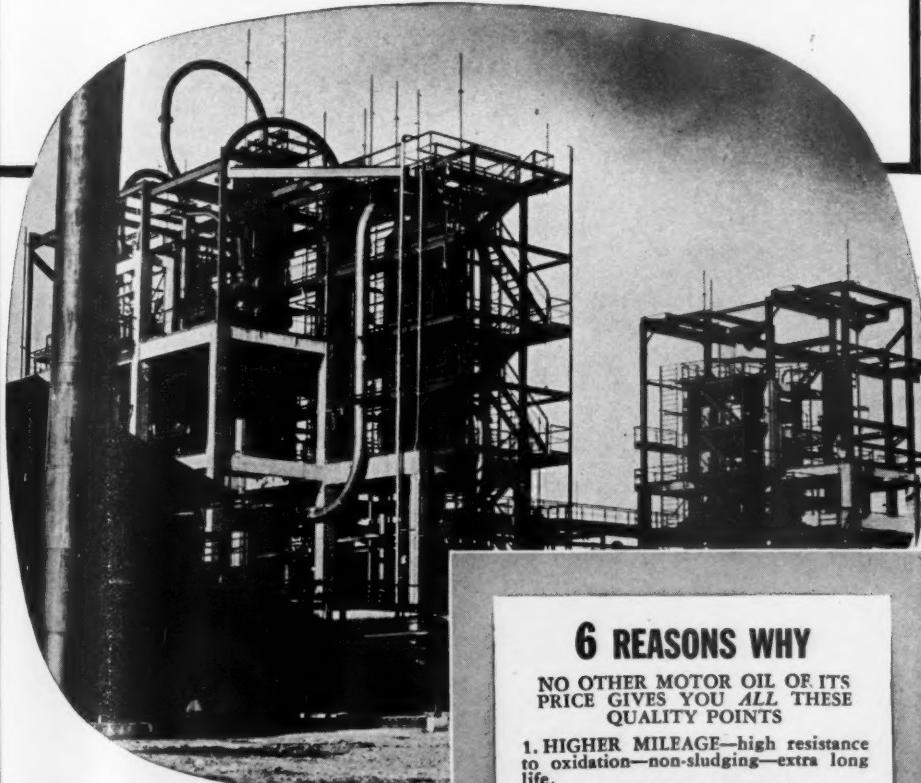
The new Gulflube motor oil, made by Gulf's Multi-Sol process, is now available to fleet operators at no higher price than they are accustomed to paying for oils refined by less efficient methods.

The Multi-Sol process makes Gulflube a premium oil in every respect. In this process, solvents of two opposite actions are used. One action dissolves out the impurities in the lubricating stock refined from the crude oil—tars, gum and carbon forming compounds—and settles them to the bottom of the extraction tanks. The other action selects the desirable parts of the oil and floats them to the top. This selected oil is then "skimmed off," thoroughly dewaxed and filtered—to form the finest motor oil ever offered at its price.

Try this extraordinary new oil in your equipment. You will be pleased with the results.

GULF REFINING CO., Pittsburgh, Pa.

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Above is a general view of Gulf's new Multi-Sol plant at the Girard Point Refinery, Philadelphia, Pa.

6 REASONS WHY

NO OTHER MOTOR OIL OR ITS PRICE GIVES YOU ALL THESE QUALITY POINTS

1. HIGHER MILEAGE—high resistance to oxidation—non-sludging—extra long life.
2. LOW CARBON RESIDUE shows premium quality for paraffinic base oil.
3. EASY STARTING and resistance to heat due to high true viscosity index.
4. ZERO POUR TEST—wax actually removed—no wax crystal poisons added.
5. HIGH FILM STRENGTH—a pure natural mineral oil—no injurious compounds added—will not corrode new alloy bearings.
6. ECONOMICAL LUBRICATION due to these quality points.



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3800 Gulf Building, Pittsburgh, Pa.

Please send me complete information and price quotations on the new Gulflube Motor Oil.

Name
Title
Company
Address

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 2

Crushers (Reduction) Bonnot Company	Drills (Blast Hole) Worthington Pump & Machy. Corp.	Forges (Oil) Gardner-Denver Co.	Loaders and Unloaders Barber-Greene Co. Bucyrus-Erie Co. Fuller Company Link-Belt Co.
Crushers (Rotary) J. B. Ehksam & Sons Mfg. Co.	Drills, Hammer (See Hammer, Drills)	Furnaces Combustion Engineering Corp.	Locomotive Cranes (See Cranes, Crawler and Locomotive)
Crushers (Single Roll) Link-Belt Co. McLanahan & Stone Corp. Pennsylvania Crusher Co. Pioneer Gravel Equipt Mfg. Co. Williams Patent Crusher & Pulv. Co.	Drills (Rock) Gardner-Denver Co.	Fuses (Detonating and Safety) Ensign-Bickford Co.	Locomotives (Geared) Lima Locomotive Works, Inc.
Crushing Rolls Allis-Chalmers Mfg. Co. Traylor Eng. & Mfg. Co.	Drives (Short Center) Allis-Chalmers Mfg. Co.	Gaskets B. F. Goodrich Company United States Rubber Co.	Locomotives (Steam, Gas and Electric) Lima Locomotive Works, Inc.
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Dredges Bucyrus-Erie Co. Hayward Co. Morris Machine Works	Engines (Steam) Morris Machine Works	I-Beam Trolleys Curtis Pneumatic Machy. Co.	Allis-Chalmers Mfg. Co. Harnischfeger Corp.
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Drill Steel Gardner-Denver Co. Worthington Pump & Machy. Corp.	Fans (Exhaust) Pangborn Corporation	Lighters, Hot Wire (For Safety Fuse) Ensign-Bickford Co.	Oilers (Air Line) Gardner-Denver Co.
Drills Bucyrus-Erie Co. Timken Roller Bearing Co.	Feeders Chain Belt Co. Fuller Co. (Cement and Pulverized Material) Hardinge Company, Inc. Pioneer Gravel Equipt. Mfg. Co. Smith Engineering Works (Plate)	Lime Handling Equipment Fuller Company Kritzer Company Link-Belt Co. Raymond Bros. Impact Pulv. Co.	Oils (Lubricating) Gulf Refining Co. Texas Company
		Lime Kilns (See Kilns and Coolers, Rotary)	Overhead Traveling Cranes Curtis Pneumatic Machy. Co.
		Linings (Iron for Ball and Tube Mills). (See Mill Liners)	Packings (Pump, Valve, etc.)
		Linings (Rubber for Ball and Tube Mills)	B. F. Goodrich Company United States Rubber Co.

DUST

GET OUT OF THE DUST CLOUD!

Over a million acres of the richest wheat fields in the United States have been totally destroyed by DUST storms in the mid-west. Scores of persons have been killed, hundreds injured, by the uncontrollable destructiveness of DUST.

DUST IS A MENACE TO INDUSTRY, TOO. For untold years it has exacted staggering wealth from the workers of the world. It has levied a toll on health and a tax on profit

greater than any other natural or mechanical cause. DUST is Man's common enemy!

Unlike the dust storms in the mid-west DUST IN INDUSTRY CAN BE CONTROLLED! Modern Dust Control Systems, as designed by PANGBORN engineers, will trap dangerous dust at its source, . . . and collect it for salvage or disposal. Let us study your Dust problems and make you a proposal—NOW. No obligation at all.

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PANGBORN

The World's Largest Manufacturers of Blast Cleaning and Dust Collecting Equipment
HAGERSTOWN MARYLAND

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 2

Paint (Asphalt) Texas Company	Ready Mixed Concrete (Truck Mixer Bodies) Chain Belt Co.	Screw Rewasher (Single and Twin) Smith Engineering Works	Tramways (Aerial Wire Rope) American Steel & Wire Co. A. Leschen & Sons Rope Co. John A. Roebling's Sons Co. Williamsport Wire Rope Co.
Pavers (Concrete) Koehring Co., Division of National Equip't. Corp.	Road Machinery Barber-Greene Co. Harnischfeger Corp. Industrial Brownhoist Corp. Koehring Co., Division of National Equip't. Corp.	Scrubbers Hardinge Company, Inc. Lewistown Fdy. & Mach. Co. Smith Engineering Works	Transmission Belting (See Belting) Transmission Machinery Allis-Chalmers Mfg. Co. Kritzer Company Timken Roller Bearing Co.
Perforated Metal Chicago Perforating Co. Cross Engineering Co. Harrington & King Perforating Co. Hendrick Mfg. Co. Morrow Mfg. Co.	Rock Bits (See Drill Bits)	Seal Rings Traylor Eng. & Mfg. Co.	Trenchers Barber-Greene Co.
Plates (Double Corrugated) Hendrick Mfg. Co.	Rock Drills (See Drills, Rock)	Separators (Slurry) F. L. Smith & Co.	Tube Mills (See Mills, Ball, Tube, etc.)
Pneumatic Drills (See Drills)	Rod Mills Traylor Eng. & Mfg. Co.	Shovels, Power (Steam, Gas, Electric, Diesel, Oil) Bucyrus-Erie Company Harnischfeger Corp. Industrial Brownhoist Corp. Koehring Co., Division of National Equip't. Corp. Lima Locomotive Works, Inc. (Ohio Power Shovel Co.) Link-Belt Company	Tube Mill Liners (See Mill Liners)
Portable Compressors Worthington Pump & Machy. Corp.	Roller Bearings S K F Industries, Inc. Timken Roller Bearing Co.	Silos F. L. Smith & Co.	Tubing (Blasting) B. F. Goodrich Company United States Rubber Co.
Portable Conveyors Barber-Greene Co. Fuller Company Link-Belt Co. Robins Conveying Belt Co.	Roofing (Ready to Lay) Texas Company	Skip Hoists and Skips Link-Belt Co. Robins Conveying Belt Co.	Tube (Seamless Steel) Timken Roller Bearing Co.
Portable Crushing and Screening Unit Good Roads Machy. Corp. Pioneer Gravel Equip't. Mfg. Co. Smith Engineering Works Williams Patent Crusher & Pulv. Co.	Roofing and Siding (Steel) Joseph T. Ryerson & Son, Inc.	Slings (Wire Rope) American Cable Co., Inc. American Steel & Wire Co. A. Leschen & Sons Rope Co. John A. Roebling's Sons Co. Williamsport Wire Rope Co.	Underground Shovels Nordberg Mfg. Co.
Powder (Blasting) Atlas Powder Co. E. I. du Pont de Nemours & Co., Inc. Hercules Powder Co.	Rope, Wire (See Wire Rope)	Sockets (Wire Rope) American Steel & Wire Co.	Valves (Pump) B. F. Goodrich Company United States Rubber Co. Worthington Pump & Machy. Corp.
Power Transmission Machinery Chain Belt Co. S K F Industries, Inc.	Rubber Covered Screens B. F. Goodrich Company	Speed Reducers Link-Belt Co. Traylor Eng. & Mfg. Co.	Vibrating Screens (See Screens, Vibrating)
Pulverizer Parts American Manganese Steel Co.	Sand Drag Smith Engineering Works	Sprockets and Chain Chain Belt Co.	Washers (Sand, Gravel and Stone)
Pulverizers (See also Crushers, Mills, etc.) Allis-Chalmers Mfg. Co. Bonnot Company Bradley Pulverizer Co. Dixie Machy. Mfg. Co. Raymond Bros. Impact Pulv. Co.	Sand and Gravel Screening and Washing Equipment Universal Road Machy. Co.	Steam Shovel Repair Parts American Manganese Steel Co.	Allis-Chalmers Mfg. Co.
F. L. Smith & Co. Universal Road Machy. Co. Williams Patent Crusher & Pulv. Co.	Sand Settling Tanks Link-Belt Co. Smith Engineering Works	Steel (Abrasion Resisting) Joseph T. Ryerson & Son, Inc.	Eagle Iron Works
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Screens, Washing (Hercules, Ajax and Standard) Smith Engineering Works	Track Equipment Lorain Steel Co. Nordberg Mfg. Co.	Texrope Belts (for Texrope Drives) B. F. Goodrich Company	Welding Rod American Steel & Wire Co. Joseph T. Ryerson & Son, Inc.
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		Tractors Koehring Co., Division of National Equip't. Corp.	Wire Cloth Cleveland Wire Cloth & Mfg. Co.
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			Wire Rope Fittings American Cable Co., Inc. American Steel & Wire Co. Hazard Wire Rope Co. A. Leschen & Sons Rope Co. John A. Roebling's Sons Co. Williamsport Wire Rope Co.
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			Wire Rope Sockets (See Sockets, Wire Rope)

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AERO 2 STAGE WORTHINGTON PORTABLE COMPRESSORS

5 SIZES:

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210 . . . 315

Cubic Feet

ACTUAL AIR
DELIVERED



Available in every
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TOWABOUT, TRAILER, TRUCK, SKID, POWER TAKE-OFF, RAIL CAR, MINE CAR

- Feather valves
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- Force-feed lubrication
- 30% reserve horsepower
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Greatest amount of air . . .
for lowest fuel and maintenance cost
Air-cooled compressor lowers upkeep cost
Balanced angle design . . . no vibration
200° lower temperatures . . . no carbon
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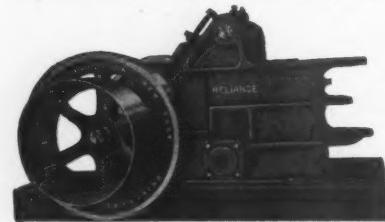


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Now you get 25 to 40% increased capacity with 25 to 30% greater recovery of fines. Product is more uniform—you get increased capacity—cleaner tailings and higher efficiency than is possible with any other air separator. Delivers products of any desired screen analysis from 60 to 400 mesh.

Many of these machines have been running 24 hours per day for years without interruption. Rugged construction plus high quality, wear-resisting material assures long, efficient, economical service.

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The one crusher that can "take it." The first Reliance All-Steel Crusher built more than 20 years ago—is still earning profits. That's the kind of service correct design—wear-resisting material and rugged construction results in. Ask for full details.

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Sales office: 114 Liberty St., New York, N.Y. Factory: Kingston, N.Y.

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Bucket Elevators	Heating Kettles	Sand, Gravel Spreaders
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Please send me further details and specifications on the equipment checked below:

- GAYCO RELIANCE AIR SEPARATORS
- RELIANCE CRUSHERS
- (Other equipment listed above)

Name..... Title.....

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RELIANCE



The country is flooded with letters requesting the recipient to send out a dime for which he eventually receives \$1,562.50. Obviously someone must hold the bag.

Equally wild are the claims made for the efficiency of various gadgets hung on vibrating screens. It is equally obvious that each additional gadget consumes extra power, and means additional replacements, and represents an endless chain of added costs.

The Late Model UNIVERSAL Super-Vibrator offers the maximum in capacity, low power consumption and all around economy. It has fewer parts, costs less to begin with and earns more per dollar invested. Repeat orders bear out these facts.

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UNIVERSAL VIBRATING
SCREEN CO.
RACINE, WIS.



MORROW SCREEN PLATES

Perforated to meet your specific requirements in the sizing and preparation of coal, sand, gravel and other bulk material.

Perforations can be had in a wide range of sizes in round, square, oval and diagonal slots.

Being specialists in screening machinery is your assurance of entire satisfaction. Deliveries are prompt.

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BIN-DICATOR

PROVIDES
NEW ECONOMY in PLANT OPERATION
AUTOMATIC INDICATION AND CONTROL
OF
BULK MATERIAL LEVELS IN BINS AT LOW COST

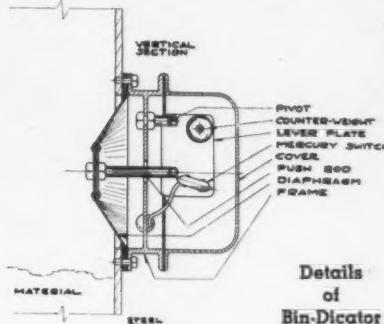
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Cement Plant Installations

ALPHA	HERCULES	LEHIGH
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(Used on Cement, Clinker, and Coal)		

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Wayne, Michigan



IMPORTANT FEATURES:

1. Heavy Cast-Iron Frame.
2. Brass Working Parts.
3. Dust-Tight Diaphragm.
4. Adjustable Counter-Weight.
5. Enclosed Mercury Switch.
6. Weather-Tight Housing.
7. Simple to Install.
8. Positive in Action.
9. No Springs.
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11. No Maintenance.

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...Built for Quarry Service!



HERE'S no question about the adaptability of Shay Geared Locomotives to quarry service. They are built for it.

Shay Geared Locomotives are rugged. This fits them to withstand abuse and to give continuous, dependable operation under the most severe conditions.

Shay Geared Locomotives have great power. Their three-cylinder engines start heavy loads

quickly and pull them up hard-to-climb grades without difficulty or delay. Speedier car movement keeps quarry production at a maximum.

Because of these advantages . . . and others we will gladly tell you about . . . the Shay is the most reliable locomotive investment you can make. Write for catalog.

LIMA LOCOMOTIVE WORKS, Incorporated

LIMA, OHIO

Sales Office: 60 E. 42nd St., New York, N. Y.

**Leaves the Hole
CLEAN as
a Hound's Tooth
Prove it on YOUR Job**



● Satisfactory sinker performance is often as much a matter of hole cleaning as of drilling speed. That's why the new S-45 Sinkers—like all other Gardner-Denver Rock Drills—are designed to leave the hole CLEAN, as well as to give you greater drilling speed.

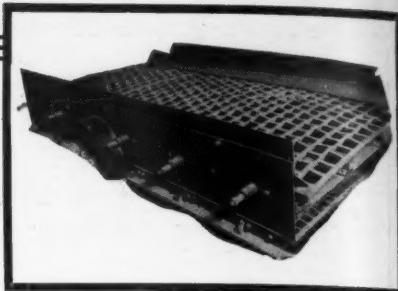
This 45-pound sinker has more drilling capacity than you've ever seen in a sinker of its weight. Air consumption is amazingly low; construction is rugged to assure utmost reliability. Try out an S-45 under your own drilling conditions. Find out what perfectly balanced design means in a rock drill!

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Horizontal, Vertical, Air-Cooled and Portable Compressors
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GARDNER-DENVER
MAKES AIR DO MORE AND COST LESS

FROM
HEAT-TREATED
STEEL



Comes its Long Life...

With Hendrick Double-Corrugated High Carbon Plate in your vibrating screens . . . besides the higher capacity . . . in addition to the more accurate screening job . . . you'll enjoy the benefits of longer service life.

Write for complete information on Double Corrugated Plate—and don't forget the complete line of Hendrick Metal Products.

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Makers of Elevator Buckets of all types, Mitco Open Steel Flooring, Mitco Shur-Site Treads and Mitco Armorgrids. Light and Heavy Steel Plate Construction.

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They save dollars on the initial investment—save more dollars because of the tremendous wearing area of the breaker plate—then consider there is the rugged construction to save those profit-consuming repair bills. The DIXIE HAMMERMILL tackles the toughest reduction problems and solves them economically. It handles wet or sticky material without clogging and reduces material to any uniform given size in a single operation. It makes every job a more profitable one.



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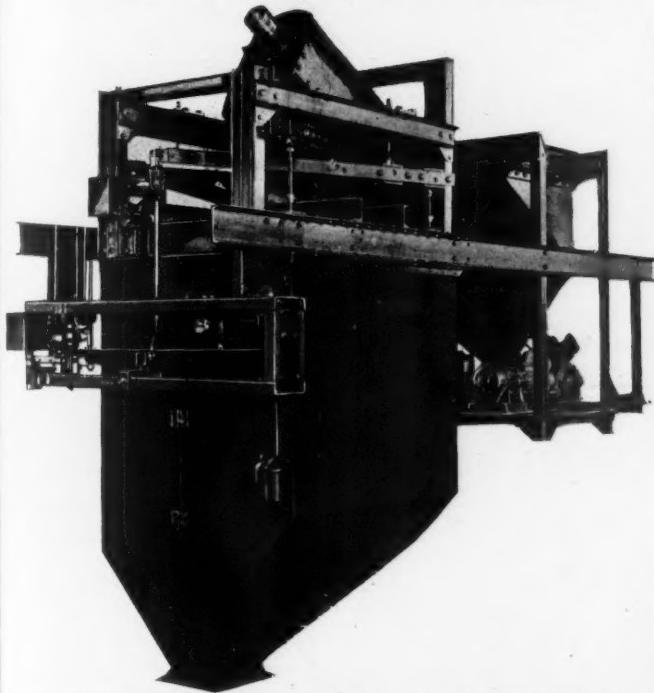
DIXIE MACHINERY MFG. CO.
4209 Goodfellow Ave. St. Louis, Mo.

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Are you equipped to weigh out Bulk Cement quickly and without delay?

Are you satisfied that your bulk loading of cars, trucks, barges, etc., is economical and accurate?

THE RICHARDSON AUTOMATIC Bulk Cement Scale



removes doubts as to weights, eliminates need for supervision or additional labor, and avoids loss in time. It weighs cement direct from storage into cars, barges or trucks accurately and continuously. Weights are recorded automatically on the scale register so that you can load exactly the amount ordered—no more and no less.

Richardson Bulk Cement Scales are used by cement mills throughout the country (complete list furnished on request). Visit a nearby installation and note the actual operation of the Richardson Cement Scale. Bulletin 9630-G describes and illustrates this scale. Write for a copy.

For PROPORTIONING RAW AND FINISHED MIX ingredients, the Richardson CONVEYWEIGH provides the most accurate and intimate mix possible. Weigh your Clinker and Gypsum, Limestone and Shale, Clay, etc., with the CONVEYWEIGH and thus positively know that your cement is always right. Write for Bulletin 10131-G giving description and list of installations.

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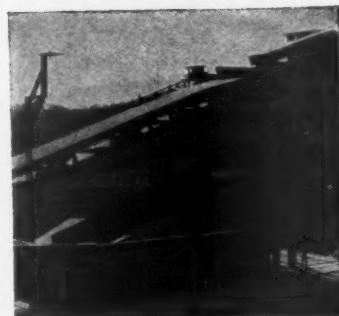


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Conveyor Idlers
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SCREENS from the smallest to the largest.

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Representatives Call Gyrex Screen Book
Equipment Bulletin

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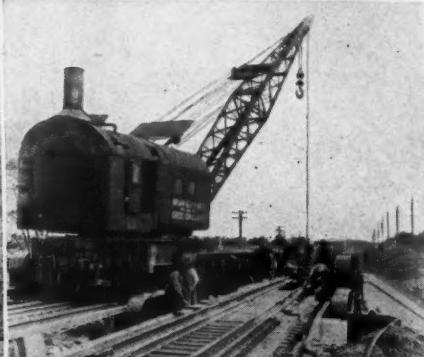
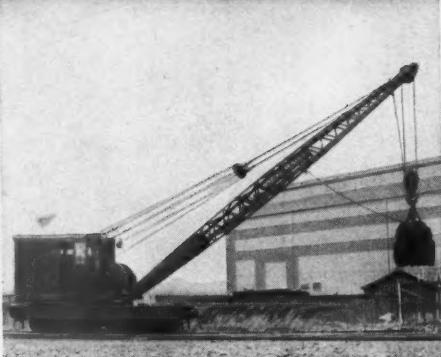
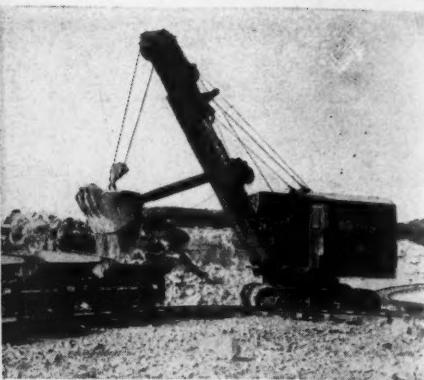
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. . . instead of making your work suit the crane . . .



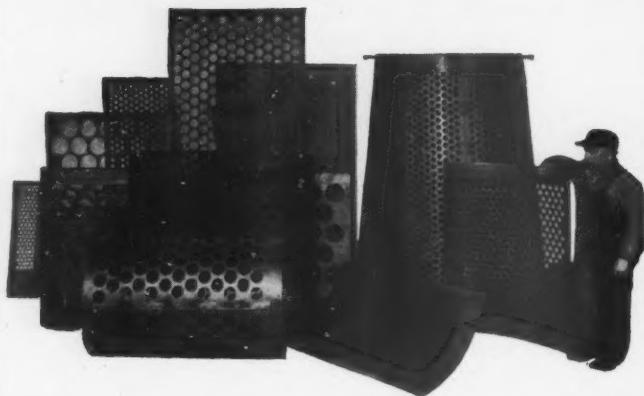
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DIESEL, GAS, STEAM OR ELECTRIC
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of Perforated Metal



For Sand, Gravel, Stone and Ore. Perforations of all standard types, also of unusual sizes and layouts to give large production and reduced screening costs.

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The
PERFORATING

5650 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N.Y.

WILFLEY Centrifugal SAND PUMP

PATENTED
for Slurry
for Sand Tailings



Described and illustrated in Catalog No. 8
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New York Office: 1775 Broadway

ELIMINATION of stuffing box has done away with many troubles common to centrifugal pumps. Pump maintains extraordinary efficiency.

Pumping parts unusually heavy, insuring long life. Cleaning out pump or changing wearing parts requires only a few minutes.

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• DREDGES

• STEAM ENGINES

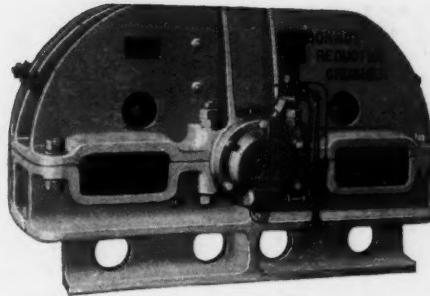
For abrasive mixtures, corrosive liquids, or clear water. Any capacity, head, or method of drive.

For sand and gravel production, water supply reservoirs, filling in, or waterways improvements.

Vertical reciprocating type, single and double cylinders, compound and triple expansion, 3 to 1000 hp.

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Baldwinsville, N.Y.



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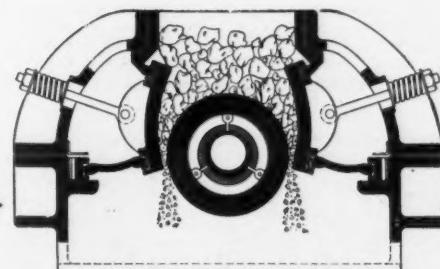
REDUCTION CRUSHERS GUARD YOUR PROFITS

Every part is designed for longer, more economical, more efficient service. The BONNOT is built with Manganese Wear-ing Parts—Cast Steel Frame—Renewable Liners — Reversible Concaves — Bronze Sleeve Bearings—Extra Large Shaft—Cast Iron Safety Plates and Positive Pressure Lubrication. The BONNOT Reduction Crusher eliminates the costly circulating load and produces material to exact specifications. It is a crusher designed by men with nearly a half century of experience.

Our bulletin No. 150 shows illustrations of material as made in one pass, as compared with the slabby material produced by less efficient crushers.

Send for this bulletin and read what prominent operators say about the BONNOT Reduction Crusher.

Write Us Today



★ *Not a roll crusher. Featuring slow creep mantle for distribution of wear* ★

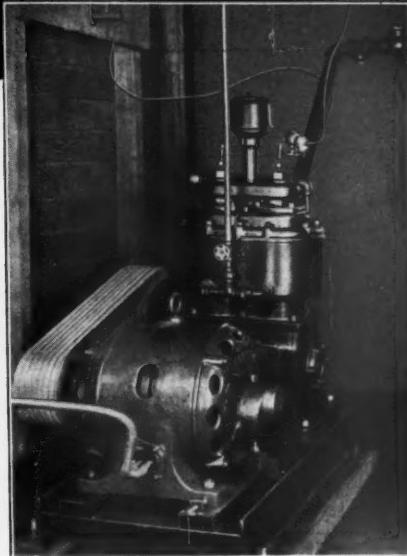
Manufactured under U. S. Patent No. 1946763

THE BONNOT CO.
CANTON, OHIO

New York Office: 30 Church St.
Offices in Principal Cities

"CURTIS COMPRESSOR"
enables one man to do the work of five"

*writes W. H. Placke,
President, The Reliable Foundry Co., Dayton, O.



The Reliable Foundry Company uses air to operate chipping hammers, pneumatic grinding wheels and for sand blasting. Mr. W. H. Placke, President of the company, reports:

"Our Curtis Compressor enables one man with a chipping hammer to do work that a gang of five men couldn't do as well by hand."

Curtis Provides Air

Pressure at Low Cost

"Running every working day for eight hours, our entire compressed air cost is only \$3.33 a day. This includes 20% depreciation, interest on our investment, incidentals and cost of electric power at our comparatively high rate of 3c per K.W.H.

"Purchased in February, 1934, during seven months' operation in our foundry, it hasn't been touched except for oiling.

"This equipment of such reliable design and make certainly fills every need."

In every type of industry, Curtis Compressors have the reputation for dependability, efficiency and ability to deliver compressed air at low cost, with important savings in time and labor. Made by a company that has specialized in compressor building for over 81 years.

*A complete report by Mr. Placke will be of vital interest to production executives. Write for your copy today.

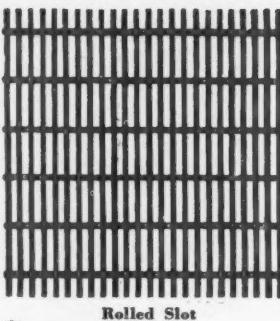
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Carbon-Free Valves
Cooled Air Intake

Timken Bearings
Centro-Ring Oiling

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HOISTS—I-BEAM
CRANES and TROLLEYS

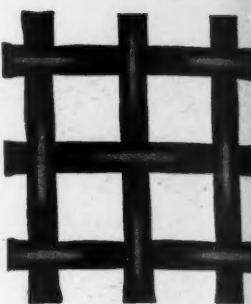


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WEAR-RESISTING!

BECAUSE MADE OF
ALLOY No. 2

an alloy enabling our "Cleveland" Screens to withstand tremendous punishment due to vibration and abrasion and continue in service long after ordinary screens would have reposed on the junk pile. That means dollars saved—higher capacity—greater accuracy and fewer replacements. Available in Square Mesh and Rolled Slot.



2 Mesh .162 Ga.

**DOES
MORE**

3574

THE CLEVELAND WIRE CLOTH & MFG. COMPANY

CLEVELAND, OHIO

**COSTS
LESS**

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E. 78TH ST.

P&H BANTAM WEIGHT
(MODEL 100 3/8 YD.)

It's not how much dirt you move that counts... it's the cost of moving it! That's where the Bantam Weight steps into the picture... digs its way to profits where larger machines can't. It's full revolving and mighty husky all around. Every waste pound is trimmed off to guarantee fastest production at lowest operating costs.

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Established 1884, Milwaukee, Wis.

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Warehouses and Service Stations:
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Dallas Los Angeles San Francisco

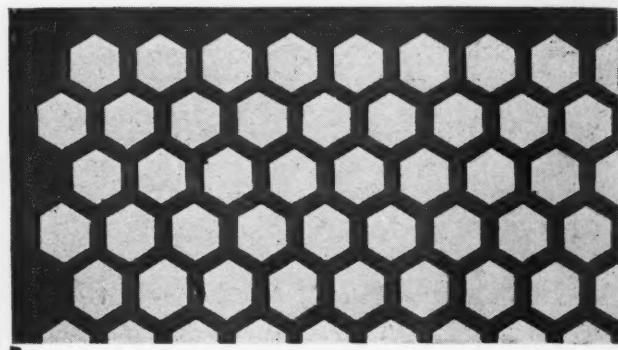
Bulletin No. 100 has complete details.
A post card will bring your copy.

HOW THE BANTAM WEIGHT MEASURES UP:

Capacity...	1/2-yard
Engine...	Ford V-8 (40 HP)
Weight... (as shovel)	13,800 lbs.
Operating Motion...	Partial Rapid Reversing
Clutches...	Appl. Second Control
Swing Clutches...	Internal Expanding
Hour Line Speed...	162 F.P.M.
Doubling Speed...	3 F.P.M.
Swing Speed...	11/2 to 3 MPH
Travel Speed...	7 F.P.M.
Height to Top of Cab...	10 Feet 4 inches

Fully Convertible as shovel, drag-line, crane, hoe, skimmer or pile driver. Simplified design of attachments makes converting practical right on the job.

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HEXSCREENS combine round-hole accuracy with square-hole capacity. Data and illustrations proving this free upon request.

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FARREL-BACON CRUSHERS
SIZES 10' x 7' to 72' x 34'

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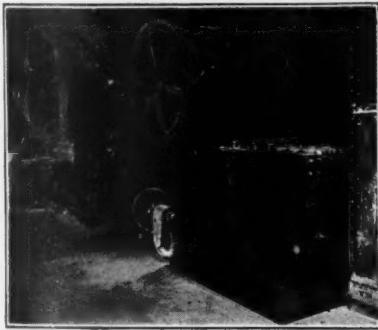
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Especially adapted for producing better crushed and graded materials in greater capacity at less cost.

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These sheets and plates were developed expressly for abrasion resistance and can be used to advantage in many places. They last many times longer than ordinary steel and in certain cases have proved better than much more expensive special alloy steels. Let us send you complete data. Write for bulletin.

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Powerful, low cost machines for pit or bank excavation—for stockpiling and reclaiming. Radius of operation, 100 to 1,000 ft. or more. Capacities: 10 to 600 cu. yd. per hour.

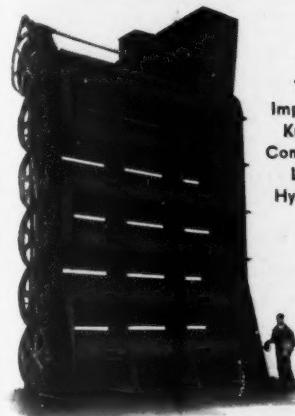
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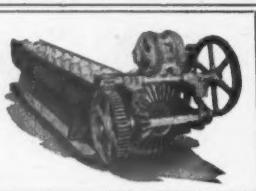
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Why ship dirty
stone when it can
be made clean easily
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SCRUBBER

This scrubber will do the good work.

State Capacity Required!

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*Mfrs. of SandCrushing, Grinding, Washing
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PRODUCE HIGH STRENGTH AND ALL TYPES OF MASONRY CEMENTS by the new process!

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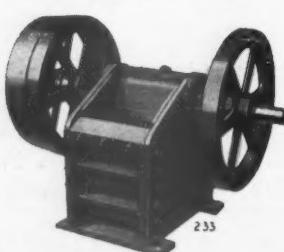
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A full series from 8"x12" up.
Plain bearings and roller bearings.
Can be furnished mounted on trucks with or without elevator and power.

Elevating, Conveying and Power Transmission Machinery, Screens and Scrubbers, Complete Plaster Mills.



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Single, Double Roll Crushers—Super Dry Pans—Steel Log Washers and Scrubbers—Dryers—Jigs—Screens—Hoists, Elevators and Conveyors—Reciprocating Feeders, Bin Gates, Chutes, Turn Tables, Elevator Buckets, Car Pullers, Rail Straighteners, Cast Parts, Rough or Finished—Car Wheels and Brake Shoes, Sprockets and Sheaves, Gears and Bearings, Gratings and Columns, Chute Linings, Grate Bars of Special Heat-Resisting Metals.

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NATIONAL SPECIAL “NAT-ALOY”

Wears five times as long as cloth made of ordinary steel.

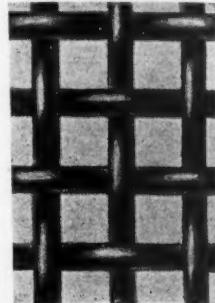
Withstands vibration without crystallization.

Super-tough to resist abrasion.

Maintains accuracy throughout life of screen.

Has outworn other special alloy cloths.

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SHOVELS-CRANES-CLAMSHELLS-DRAGLINES
3-4yd., 1yd., 11-4yd., 11-2yd., 13-4yd. and 2-yd.

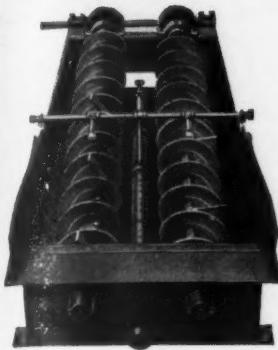
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LIMA LOCOMOTIVE WORKS, Inc.
SHOVEL AND CRANE DIVISION

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It is part of Rock Products' conception of its duty to readers and subscribers to help them in every possible and legitimate way. The "Situations Vacant" and "Situations Wanted" advertisements are a part of this service. The charges of 2 cents a word, or a minimum charge of a dollar per insertion, are nominal and not designed for profit. Numerous letters from these advertisers assure us of the effectiveness of these advertisements in finding capable men for openings and of finding openings for capable men.

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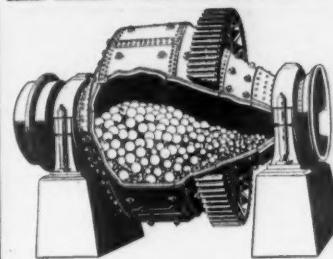
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Guaranteed removal of trash, sticks, leaves, coal, silt, mud-balls,—to the difficult clay-balls and iron oxide conglomerates.

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The only Mill that classifies as it grinds—either wet or dry. Holds the record for lowest maintenance cost of all types of Pulverizers. Write for Bulletin 13C.

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INCORPORATED
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Rate per column inch, \$4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

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FOR SALE

All Equipment Now in Place in Large Quarry Located, Joliet, Illinois.
All Items Now Being Offered at Consistently Low Prices, Including:
30" McCully Gyratory, Tex Rope Drive to 156 HP. Slip Ring Motor.
16-A Teismith Primary Gyratory.
3-F Teismith Reduction Crusher.
4' Symons Cone Crusher, direct connected.
9 Ton Whitcomb Gasoline Locomotive, 46" Ga., Climax Engine.
7 Ton Whitcomb Gasoline Locomotive, 46" Ga., Waukesha Motor.
25 Ton American Saddle Tank, Std. Gauge, 18 Yd. Quarry Cars, 46" Ga., Steel Bodies.
24" Allis-Chalmers Bucket Elevator, 70'.
20' Bucket Elevator, 68' Centers
36" Bucket Elevator, 66' Centers
20' Belt Conveyor, 22' Centers
22' Belt Conveyor, 32' Centers
48"x20' Austin Rotary Screen.
40"x16' Austin Rotary Screen.
12" x 12" Gardner Air Compressor, 75 HP. G. E. Slip Ring Motor.
173 CFM Ingersoll-Rand Belted Compressor.
2 18-B Bucyrus Steam Shovels.
Gardner-Denver Drill Tower complete.
6" x 8" Dayton-Dowd 2-Stage Centrifugal Pump, cpld., 4-cyl. Gas Engine.
24" diameter x 30" Face Single Drum Heavy Duty Friction Hoist.
10 Ton American All Steel Stiff Leg Derrick, 25 Jack Hammers and Drifters, Drill Sharpener complete.
100 Tons of 60 and 50 lb. Rail.

Ready for Shipment from Our Chicago Warehouse

Nos. 36 and 42 American Ring Pulverizers.
No. 3 Williams Heavy Duty Hammer Mill, 54" x 40' Direct Heat Rotary Dryer.
6, 8, 10, 12" Amco Sand and Gravel Pumps.
9x8, 9x10, 10x10, 12x12, 14x12, Belted Air Compressors.
6, 8, 10 Ton Tandem Gasoline Locomotives.
1/2, 1, 1 1/2, 2 Yd. Sauerman Cableways.
1/2, 1, 1 1/2, 1 1/4, 2, 4 and 6 Yd. Sauerman Drag Scraper Outfits. Also extra Buckets.
150, 180 HP. Full Diesel Engines.
Send for complete Stock List covering Cranes, Shovels, Draglines, Crushers, Screens, etc.

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12-Yd. Western Air, also Hand Dump Cars, Flats, Gondolas, Steel Hopper Cars, Box Cars, Locomotives.

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Railway Exch. Bldg. 101 West 31st St.
St. Louis, Mo. New York

FOR SALE

125 HP., Elec. A.C. 2-drum, 1300' Cable-way, 2" cable, 100' steel mast, 1 1/2-yd. all ball and roller bearing, complete, slightly used, now setup.
300 ampere Elec. Arc welder.
2 new Gas engines, 45 and 25 HP.
135 HP., 4-cyl. Gas Engine.
150 HP., 3-cyl. Gas Engine. Several with Generators attached.
Byers gas. Shovel on Cats. with clam-shell and skimmer attachs.
Osgood steam Shovel on cat., 1/2-yd.
70' steel guy Derrick complete, \$275.
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Saunders 2 1/2" to 10" pipe Machine, weight 10,000 lbs., \$375.00.
Several Anchor Block and Brick Machines, Blystone Mixer, all belt drive, used 6 months making cinder bricks and blocks. Also approximately 5,000 cast iron Pallets, Kiln racks, etc.
50 HP. steam traction Engine.
10x10 Ingersoll Compressor, \$150.00.

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Huntington, West Virginia

Shovels, Cranes, Draglines

1— 3/8 Bay City Tractor shovel.
1— 1/2 Byers comb. shovel and dragline.
1— 3/4 Thew gas shovel.
1— 1 Northwest dragline, 40' boom.
1— 1 1/4 Northwest comb. shovel and drag.
1— 1 3/4 Northwest dragline, 60' boom.
1— 2 1/2 yard steam crawler shovel.
1— 20 Ton, 8 wheel gas locomotive crane.
1— 25 Ton, 8 wheel gas locomotive crane.

OTHER ITEMS

6—12-ton, 36-ga. Whitcomb locomotives.
14—4-yard Western dump cars.
1—Narrow ga. Western spreader car.
3—60 Caterpillar tractors.
1—Sullivan type "C" drill sharpener.
Jack hammers, drills, compressors, etc.

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LOCOMOTIVES

STANDARD GAUGE

30-ton American 4-wheel saddle tank.
33-ton Vulcan 4-wheel saddle tank.
36-ton Porter 4-wheel saddle tank.
40-ton Baldwin 4-wheel saddle tank.
40-ton Davenport 4-wheel saddle tank.
40-ton American 4-wheel saddle tank.
50-ton American 4-wheel saddle tank.
All equipped with Code Boilers, thoroughly rebuilt and ready for immediate shipment.

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BIRMINGHAM, ALABAMA

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JAW CRUSHERS—7"x11"- 8"x14"- 9"x15" - 10"x16" - 6"x20" - 11"x22" - 12"x24" - 13"x30" - 15"x30" - 18"x36" - 20"x50" - 28"x36" - 30"x30" - 26"x42" - 36"x48" - 42"x60" - 56"x72" - 36"x60" - 66"x84" - 42"x40".
Crushing Rolls—16"x10" up to 54"x64".
Gyratory Crushers—From No. 2 up to No. 12. No. 0-No. 1 and No. 7 ring roll mills.
No. 1—No. 1 1/4 and No. 2 rotary fine crushers. Swing hammer mills.
3"x25"-4"x30"-5"x50"-5 1/2"x40"-6"x50" and 8 1/2"x75" direct heat rotary dryers.
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Indirect heat and steam heated air rotary dryers.
Rotary cement kilns 3' to 8' diameter.
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Hoist—Air compressors—Cranes & Shovels.
Complete Asphalt Mixing Plants (New).
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Continued from Preceding Page

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1-2-yd. Bucyrus 50B Shovel.
1-1½-yd. BYERS Crane.
1-1-yd. OSGOOD Shovel-crane.
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1-1-yd. P. & H. 600 Shovel.
1-¾-yd. P. & H. Shovel-crane.
1-½-yd. BYERS Shovel-crane.
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1-265-ft. Gas Portable Compressor and
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Electric Draglines, 2- and 3-yd.
Gasoline Draglines, ½- and ¾-yd.
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24" Conveyor 65 and 170 ft.
Clamshell Buckets, ½ to 1½ yd.
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18x36 Farrel B Jaw Crusher.
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Howe 150-ton Track Scale.
Traylor 30-in. x 60-ft. Bucket Elevator.
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Ingersoll-Rand 34 Drill Sharpener.
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12—5-yd. 36" ga. Western Dump Cars.
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8—DRAG SCRAPER outfits, sizes ½ to 2½ yds.
5—SLACKLINE outfits, sizes ½ to 2 yds.
50—Wire Rope blocks. Most all sizes.
Some GOOD used wire rope.
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Rock Crushers—Also Extra Heavy Type Revolving Cylindrical Screens. 46" Diameter, 24' Long. Suitable for Heavy Screening Service

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20,000 ft. NEW Belting in original rolls, size 30" to 8" widths, 100 to 500 ft. lengths, Medium and Heavy weights. Suitable for Conveyor or Transmission. For Sale at 50% of its original manufacturing price. Send for itemized list of sizes, quantities and prices.

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One Ingersoll Rand 2,000 foot, Class Type No. 10

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1 Browning Standard Gauge, 38' Lattice, Steel Boom, Capacity 5,000 pounds, 40' Radius

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All Excellent Condition

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Motors and Generators, A.C. and D.C., for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

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2 NEW Modern A-C Comp. Mills.
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1-Yd. Osgood Crawler Shovel, rebuilt.
Side and Center dump cars.

Locomotives—75-ton Switcher, code boiler
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Cranes and Draglines, various sizes.

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Take advantage of the Opportunity offered in the Used Equipment Department to dispose of the equipment that you no longer need.

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An Aerial Tramway to convey rock for a distance of a mile and one-half. Address Box 674, care of Rock Products, 330 South Wells Street, Chicago, Illinois.

WANTED

One 36"x36" single-roll Jeffrey crusher; one 4'x8" two-deck mechanical vibrating screen. Address Box 677, care of Rock Products, 330 So. Wells St., Chicago, Ill.

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A.C. and D.C. Motors, Generators, Transformers, Circuit Breakers, Meters, etc. Send Us a List of Your Idle or Surplus Electrical Equipment

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WANTED

2 used Sauermann drag scraper buckets of $\frac{1}{2}$, $\frac{5}{8}$ or $\frac{3}{4}$ cu. yd. capacity.

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P. O. Box 517, Arkadelphia, Ark.

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A complete sand and gravel plant located on railroad siding with $\frac{1}{2}$ mile of track. Near manufacturing city. New Castle, Pa., district. Equipped with all machinery necessary to operate. Electric Hoist, tipple, pumps, bins, etc. Immediate possession at a real bargain. Will sell as an operating plant or equipment to be dismantled.

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Specializing in Gypsum Plants and in the Mining, Quarrying and Manufacture of Gypsum Products.
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PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

H. D. RUHM

Consulting Engineer
Dealer in PHOSPHATE LANDS and all grades of rock.
10-mesh PHOSPHATE FILLER, \$3.00 net ton
40 years' experience TENNESSEE PHOSPHATE FIELD. Correspondence solicited
Can find what you want if it can be found.
305 West Seventh St., Columbia, Tennessee

POSITIONS WANTED

LIME PLANT SUPERINTENDENT desires a permanent connection; 20 years' experience in operating lime plants, limestone quarries, and crushing plants; also have years of experience in the burning of lime, hydration, and construction. Efficient and successful handling of equipment and labor. First-class mechanic. Experience in the clerical functions in plant costs. Excellent references. Address Box 638, care of Rock Products, 330 South Wells St., Chicago, Ill.

CEMENT PLANT SUPERINTENDENT with 20 years' experience would like to make a connection with a cement organization. Position immaterial. Master Mechanic or Asst. Superintendent. Good mechanic, with experience covering heavy machinery, construction or operation. Wet and dry experience. Capable handling men. References in regard to character and ability. Employed at present. Address Box 671, care of Rock Products, 330 South Wells Street, Chicago, Ill.

POSITION WANTED AS SUPT. WITH A progressive stone company; 20 years' experience operating limestone quarries and crushing plants; familiar with all modern equipment, efficient handling of labor and low cost of production; qualified to assume full charge of any size plant; unquestionable reference. Address Box 654, care of Rock Products, 330 South Wells St., Chicago, Ill.

NOW AVAILABLE—MY SERVICES, ON either temporary or permanent basis, as Technical Consultant on Lime—covering advertising, sales promotion, process development, technical service to customers, or other problems confronting the lime industry. Address Sidney P. Armsby, 209 W. 11th St., Rolla, Mo.

ENGINEER OFFERS SHORT TIME CONSULTING service on gravel-pit and quarry reports—geology, plant design, and in particular, the commercial value of plant for any given location. Wide general experience and a very special experience in plant design for difficult cleaning and recovery operations. Roy Reddie, Consulting Engineer, Knoxville, Tennessee.

CHEMICAL ENGINEER — CHEMIST EXPERIENCED in Lime, Gypsum and Cement, research, construction and production. Address Box 676, care of Rock Products, 330 South Wells Street, Chicago, Ill.

VALUE!

GOOD USED EQUIPMENT Selected Special Items

- 1—No. 37 Marion Electric Shovel.
- 1—No. 1260 Jeffrey Bakstad Jaw Crusher.
- 1—8'x8'x85' Ruggles-Coles Class A Rotary Dryer.
- 2—5'x26' Ruggles-Coles Rotary Dryers.
- 1—5-roll Raymond high side Mill.
- 2—3-roll Raymond high side Mills.
- 3—5'x50' Allis-Chalmers Rotary Dryers.
- 1—8'x125' Rotary Kiln.
- 5—6'x6'x60' Vulcan Rotary Kilns.
- 1—3'x25' Bonnot Rotary Dryer-Kiln.
- 1—8'x12' Oliver Rotary Filter.
- 1—12' Gayco Air Classifier.
- 5—5'x22' Gates iron-lined Tube Mills.
- 1—7'x24" Sturtevant Jaw Crusher, to $\frac{1}{2}$ ".
- 1—36"x36" Gruendler Hammer Mill, roller bearing.
- 1—36"x24" Jeffrey type D Hammer Mill.
- 1—7' Symons Cone Crusher.
- 2—20x14, 36x16 Sturtevant Crushing Rolls.
- 1—30x10 Colorado Iron Works Crushing Roll.
- 1—24"x72" Magnetic Pulley, complete.
- 6—Hardinge Ball Mills, 4 $\frac{1}{2}$ x16, 6x22, 6x36, 7x36, 8x22, 8x30.
- 1—3'x12' Hendy iron-lined Tube Mill.
- 2—6'x35' Louisville hot air Rotary Dryers.
- 2—6'x45' Rotary Dryers—MONEL LINED.
- 3—3x5, 4x5, 4x7 Tyler Screens.
- 1—4'x8' Rotex, single deck.

Some of the Items Remaining at the Manganese Plant, Cartersville, Ga.

(Refer to our ad in May issue).

- 30—GE Motors, all 3 ph., 60 cy., 2,200 v.; 400 hp. Syn., 200 hp. Syn., 200 hp. S. R.; Sq. Cage, 150 hp. S. R., 100 hp. S. R.; 75, 50, 40 hp., Sq. Cage.
- 16—Multi-stage Dayton-Dowd hydraulically balanced, bronze fitted Centrifugal Pumps, 578" to 116" head, each with direct connected 3/60/2200 motor.
- 1—Apron Feeder, 5'3" C/C, 60" wide, with motor and reducer.
- 1—20' 20" Conveyor, motor, reducer.
- 1—48" C/C enclosed Bucket Elevator, 14" buckets, 3/32" rubber covered belt, with motor and reducer.
- 1—220' Gardner-Denver portable Gasoline Compressor.
- 1—250-ton steel structural bin, two sec.
- 1— $\frac{3}{4}$ -yd. Thew Crawler Gasoline Shovel.
- 2—Shepard-Niles Traveling Cranes, 20-ton, 30' span—10-ton, 24' span, hand chain operated.
- 1—30-ton Plymouth Gasoline Locomotive.
- 1—27"x15" Dorr Classifier.
- 2—Dorr Bowl and Rake Classifiers, 20' bowls, 6'x33 $\frac{3}{4}$ " rakes.
- 9—Jigs, Allis-Chalmers, Woodbury, with 5 hp. var. speed motors. Texrope drives.
- 4—Fahrenwald Classifiers, 5-pocket.
- 4—Dodge Sand Dewaterers, capacity 120 t.p.h.
- 1—16' Allis-Chalmers Log Washer.
- 2—Allis-Chalmers Log Washers.
- 9—50-ton Steel Ore Cars, drop bottom.
- 8—6" Georgia Iron Works Dredge Pumps.
- 3—4'x5' No. 37 Tyler Screens, 2-deck.
- 1—Ruth Laboratory Rod Mill.
- 1—Main structural Steel Building, corrugated steel roofing and siding. Approx. 400-tons, 106'x140', 3 floors.
- 2—Heavy structural Steel Buildings, as above, each 40'x50', 2-story.
- 5—Buildings, wood and steel frame, corrugated siding. Write for details.

SEND FOR COMPLETE BULLETIN

containing details and photographs of equipment at this plant; also, our regular stock of Crushers; Vibrating Screens; Ball, Rod, and Tube Mills; Air Compressors; Rotary Kilns and Dryers; Hardinge Ball and Pebble Mills; Raymond and other Pulverizers; Air Classifiers; Thickeners; Wet Classifiers; Filter Presses; Continuous Filters, etc.

CONSOLIDATED PRODUCTS COMPANY, INC.

15-16-17 Park Row, N. Y. C.

Cable: Equipment.



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WE RECOMMEND
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